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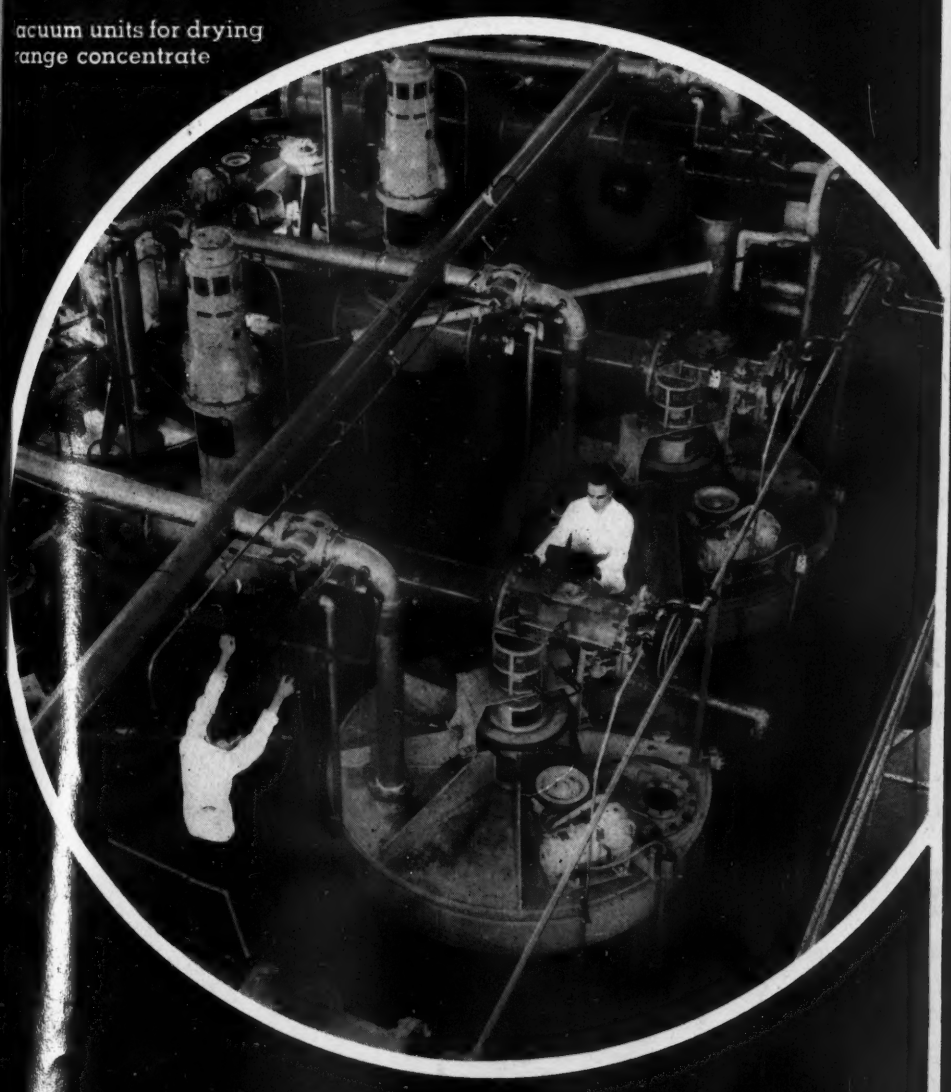
FOOD INDUSTRIES

NATIONAL EDITION

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



acuum units for drying
range concentrate

MAY 1947

New Device For Grading Pectins

Vacuum Drying Of Orange Juice

Frozen Cooked Food Quality Control

Cutting the Cost Of Skinning Franks

H. F. Sterilization Of Canned Foods?

Wet Strength Paper Used for Wrappers

Organic Chemistry in the Food Field

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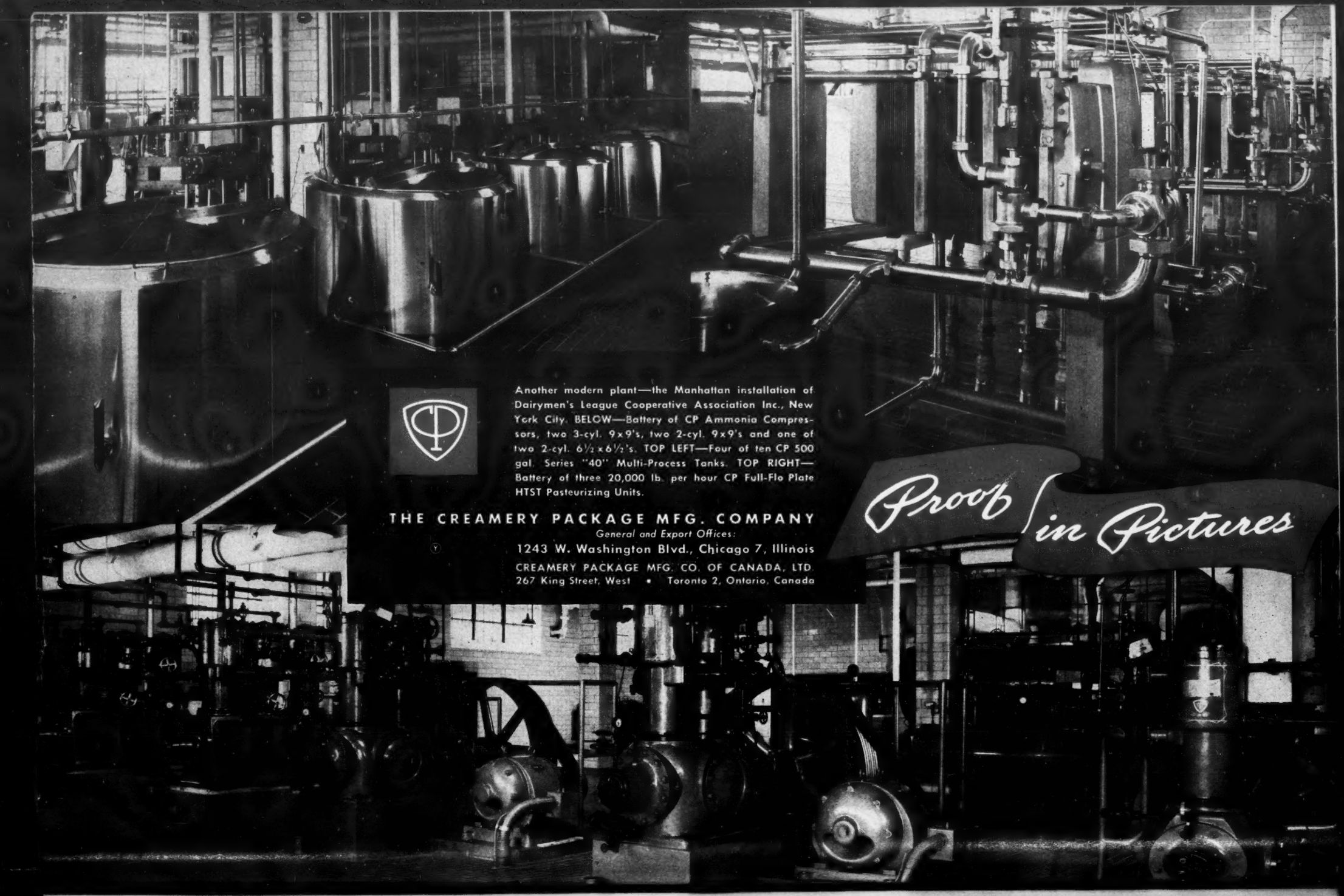
Another modern plant—the Manhattan installation of Dairymen's League Cooperative Association Inc., New York City. BELOW—Battery of CP Ammonia Compressors, two 3-cyl. 9x9's, two 2-cyl. 9x9's and one of two 2-cyl. 6½x6½'s. TOP LEFT—Four of ten CP 500 gal. Series "40" Multi-Process Tanks. TOP RIGHT—Battery of three 20,000 lb. per hour CP Full-Flo Plate HTST Pasteurizing Units.
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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

MAY, 1947 Volume 19, Number 5

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THE COVER

High vacuum drying units will each turn out 450 lb. of powdered orange juice a day at the Plymouth, Fla., plant of Vacuum Foods, Inc. Powder is canned. Cans are gassed with nitrogen before lids are clinched. See p. 107 for story on the concentrating process.

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FOOD INDUSTRIES is published monthly. Price 35c per copy. PUBLICATION OFFICE: 210 S. Desplaines St., Chicago 6, Ill. Entered as second-class matter at the Post Office at Chicago, Ill., under the act of March 3, 1879. Subscription rates: United States and possessions, $3.00 a year, $4.00 for two years, $5.00 for three years. Canada, $4.00 a year; $6.00 for two years; $8.00 for three years (payable in Canadian or U. S. Funds). Pan American countries $5.00 for one year, $8.00 for two years, $10.00 for three years. All other countries, $15.00 a year, $25.00 for two years, $30.00 for three years. Return postage guaranteed. McGRAW-HILL PUBLISHING CO., INC., James H. McGraw, Founder and Honorary Chairman. EDITORIAL AND EXECUTIVE OFFICES: 330 West 42nd St., New York 18, N. Y. BRANCH OFFICES: 738-9 Oliver Bldg., Pittsburgh 22; Aldwych House, Aldwych, London, W. C. 2; Washington 4. JAMES H. McGRAW, Jr. President; CURTIS W. McGRAW, Senior Vice-President and Treasurer; JOSEPH A. GERARDI, Secretary; NELSON BOND, Director of Advertising; EUGENE DUFFIELD, Editorial Assistant to the President and J. E. BLACKBURN, Jr., Vice-President (For Circulation Operations). CABLE ADDRESS: "McGraw-Hill, N. Y." Member A.B.P. Member A.B.C. Contents indexed monthly in Industrial Arts Index.

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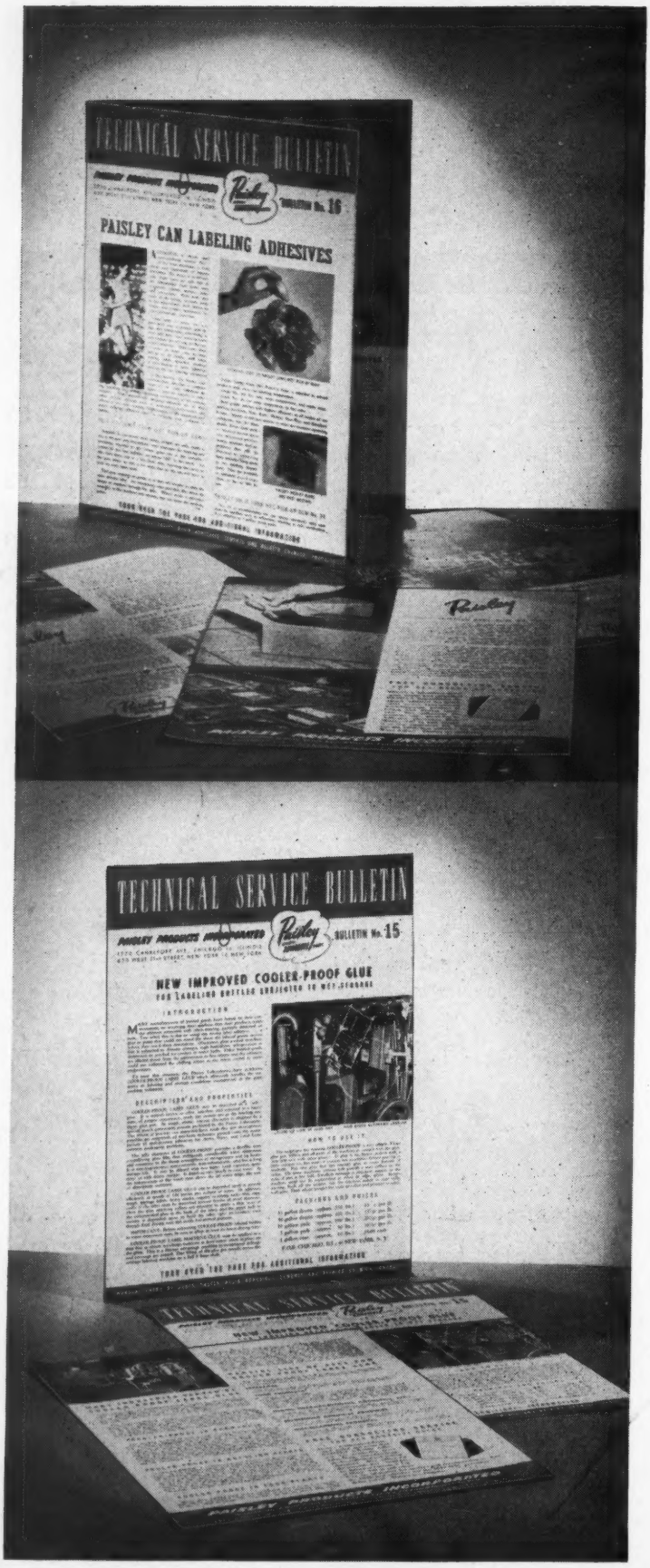

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USA 1950-1960

The Twentieth Century Fund, a privately-endowed research foundation, has just completed a monumental 875-page work called "America's Needs and Resources." In it is presented a detailed preview of what economic life in the U. S. A. during the 1950-60 decade will be like if we succeed in maintaining high-level employment. From the findings of the Twentieth Century Fund survey, the McGraw-Hill Department of Economics has prepared this synopsis, which highlights points of interest to readers of this magazine.

1940
1950
196
MORE PEOPLE WORKING . . .
EACH PRODUCING MORE . . .
CAN TURN OUT ENOUGH GOODS AND SERVICES . . .
FOR CONSUMERS, CAPITAL INVESTMENT AND GOVERNMENT
WITH THE RESOURCES AVAILABLE . . .
TO MEET ALMOST ALL OUR NEEDS
NEEDS
PRODUCTION

POPULATION

A nation's wealth depends more than anything else on the size and vigor of its population. Much of the increase in U. S. production during the past hundred years is a result of a rapid growth in population. This growth supplied manpower for farms and factories and provided an expanding market for consumer goods and services.

MORE PEOPLE WORKING . . .

Growth was the outstanding fact about population before 1930. The birth rate was almost double the death rate and there was a heavy flow of immigrants. Between 1900 and 1930, the population increase averaged 15 million each decade. Immigration contributed a third of the increase.

But this trend was checked by the depression 30's which stemmed the flood of immigrants and cut the birth rate by forcing postponement of many marriages. As a result, fewer than 9 million persons were added to the population between 1930 and 1940. This was an important factor in prolonging the depression because it slowed the growth of consumer markets.

WARTIME MARRIAGE BOOM

War and postwar conditions have brought a boom in marriages. They have exceeded normal by more than 1,500,000 since 1940. There will be more newly-married couples in 1950 than ever before and the birth rate may be roughly 10% higher than in the early 1930's. So the 20th Century Fund looks for an increase of 12 million in total population between 1940 and 1950 and a further increase of 10 million in the 1950's.

This will mean a faster-growing market for homes, autos, food, clothing, and other consumer items than we had in the 1930's. It will mean crowded schools and more people seeking jobs.

There are four major population trends which will affect markets in the 1950's:

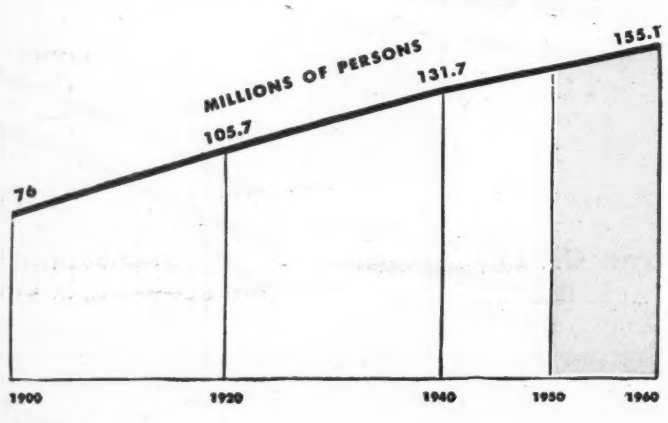
1. The number of families will continue to increase more rapidly than the number of people as families grow smaller. This is significant because the market for housing, appliances, and many other things depends more on the number of families than on the number of people.

2. Our population will be getting older. But it will not be getting less productive because the proportion of the population between the ages of 20 and 60 will be higher than in past decades. Still, the most striking increase will take place in the number of people over 60—from 14 million in 1940 to more than 20 million in 1960. This will bring greater demand for medical services and social security. An important cause of this trend is our success in controlling communicable disease. The following table shows how the death rate from selected causes has changed since 1900.

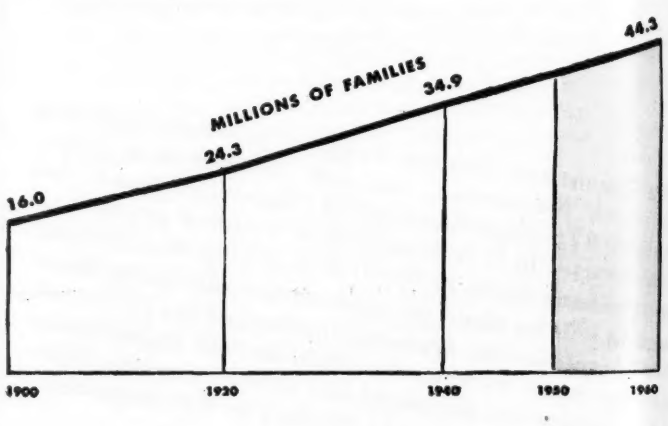
Death Rate Per 100,000 Persons

	1942	*1900*
Diseases of heart	295	137
Cancer and other malignant tumors	122	64
Influenza	56	202
Tuberculosis	43	194
Diarrhea and enteritis	9	143
Whooping cough	2	12
Diphtheria	1	40
Measles	1	13
Typhoid and paratyphoid fever	0.5	31
Scarlet fever	0.3	10
Other	505.2	873
	1035.0	1719

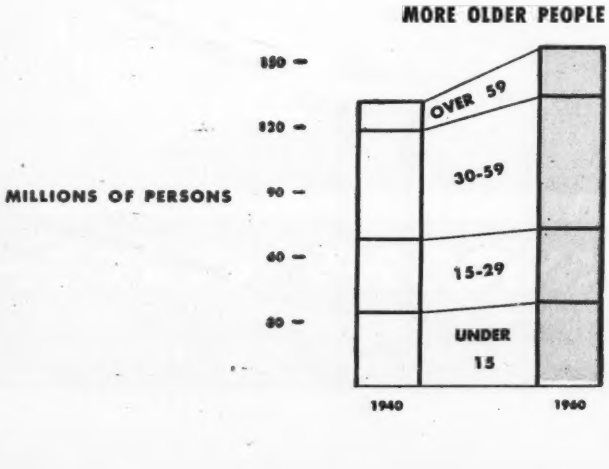
TWICE AS MANY PEOPLE



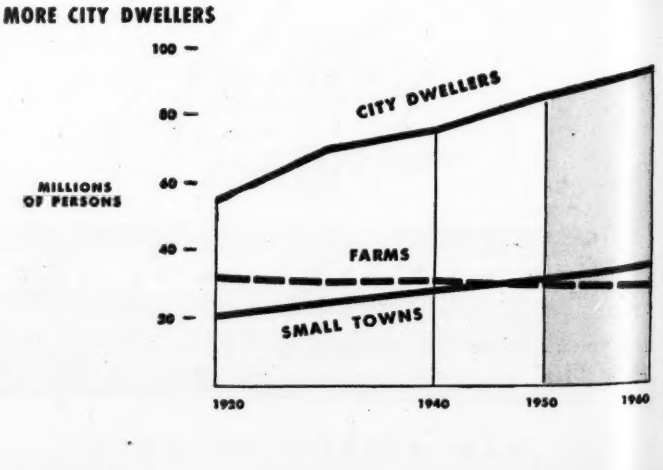
BUT THREE TIMES AS MANY FAMILIES



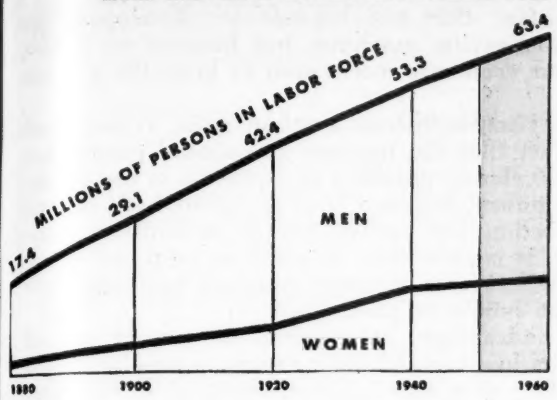
MORE OLDER PEOPLE



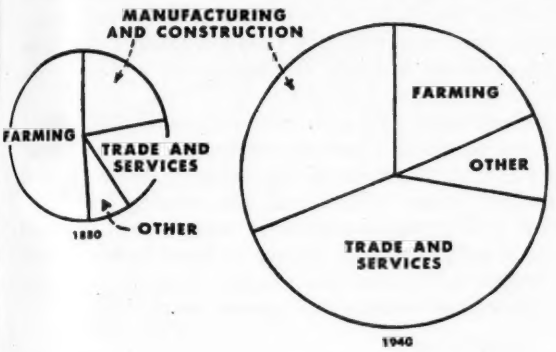
MORE CITY DWELLERS



MORE AND MORE WOMEN ARE SEEKING JOBS

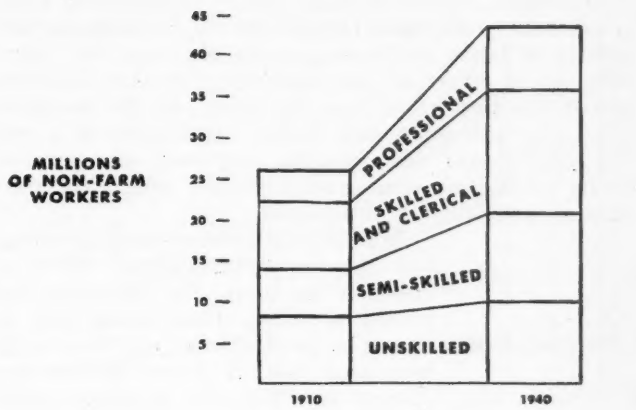


FARMING IS GIVING WAY TO OTHER OCCUPATIONS



ANATOMY OF THE LABOR FORCE

THE LABOR FORCE IS GROWING MORE SKILLED



3. The population will continue to become more urbanized. Small and medium-sized cities will grow faster than the largest cities. The general westward migration which was accelerated by the war will continue.

4. Our people will keep on getting more homogeneous. There has been almost no immigration since 1929, so the number of immigrants who have been in the country for less than 20 years will make up less than one percent of the population in 1950 as against 10% in 1930.

An even more important factor in making the population all of a kind has been the growth of universal education. The proportion of children 14-17 years old attending high school doubled between 1920 and 1936. The rise of the radio, movies, and national magazines has also levelled us out. These developments not only raise the general educational level of the nation but also tend to standardize the public's tastes and attitudes.

LABOR FORCE

The volume of goods and services produced by 145 million persons in 1950 and 155 million in 1960 will depend on what share of the population is in the labor market and the amount of work those employed actually do. The proportion of the population in the labor force has shown little change in the past few decades. So the 20th Century Fund assumes that the relationship between labor force and population will be about the same in 1950 and 1960 as it was just before the war. On this basis 60 million people will be in the labor market in 1950 and 63.4 million ten years later.

As you can see from the charts, however, there will be several important changes in the composition of the labor force. More women will be working. In 1870 only one out of every eight worked. By 1940 the proportion had grown to one out of four, and evidently will go on rising.

However, the increase in the number of women working will just about be offset by earlier retirements and longer schooling. This explains why there is little change in the ratio of labor force to population.

UNEMPLOYMENT

The effectiveness of the labor force depends not only on its size but on how fully it is employed. We have never had full employment in the sense that everyone able and willing to work had a job at the same time. Even in good years unemployment has seldom averaged less than 5% of the working force because workers are always moving from job to job. And in 1932, nearly one-fourth of all workers were unable to find jobs.

For this reason, the 20th Century Fund assumes that, even with good business in the 1950s, unemployment will average 5% of the labor force. This works out to 3 million unemployed in 1950.

In addition, the Fund expects the long down-trend in average weekly hours to continue. A century ago, workers put in a 12 hour day for 6 days a week. By 1940 the average work-week had declined to 44 hours in non-agricultural jobs and 52 hours in agriculture. If this trend continues, the average in non-farm jobs will be down to 38 hours a week in 1960, and farmers will work 48 hours.

Adding all this up, and allowing for vacations, absenteeism, and sickness, the 20th Century Fund estimates that the U. S. will put in 121 billion man-hours of work in 1950 and 118 billion in 1960. This compares with 105 billion in 1940 and with 154 billion at the peak of the war effort. The quantity of goods and services that can be turned out with this amount of labor effort will depend on average output per man-hour, or productivity.

PRODUCTIVITY

The key to our future economic welfare is productivity. It is the five-fold increase in output per man-hour that has made it possible for us to work shorter hours and still enjoy a rising standard of living. This increase in productivity has been accomplished not by working harder but by constantly inventing better machinery to supplement human energy with mechanical power.

Of course, in any specific factory at any given time, productivity depends largely on the willingness and ability of labor and management. But over the years, the actual effort of the individual worker becomes much less important than the effort of the machine. The most energetic and skilled blacksmith of a century ago could not remotely approach the productivity of today's semi-skilled worker operating automatic power-driven equipment.

EACH PRODUCING MORE . . .

In 1860, the average worker turned out 33¢ (in 1944 dollars) worth of goods in an hour. By 1940, this had grown to $1.22. This sensational increase in productivity was due to the increased use of power-driven machines. In 1860, the average worker had the help of only half a horsepower of animal or mineral energy. In 1940, he had the use of 2.7 horsepower. To put it another way, if there had been no increase in the use of mechanical power since 1850, it would have taken 290 million workers to turn out the amount of goods and services actually produced at the peak of the war effort by only 63 million workers.

DO MACHINES KILL JOBS

Past history also shows that we need not fear the long run effects of the introduction of labor-saving machines. On the contrary, the only way we can improve the material welfare of everyone is to continue and even step up the rate at which we save labor by using machines.

Some people, it is true, are thrown out of work and a few of them may not be able to find other jobs easily. But mechanization more than compensates for "technological unemployment" by making it possible to produce more and better things for everyone—things that themselves create jobs. Development of the railroads and the automobile, for example, put a lot of canal boat and livery stable operators out of business. But it cut the cost of transportation and created many times more jobs than it eliminated.

The 20th Century Fund also points out that the most important reason that the technological revolution developed luxuriantly in the U. S. between 1850 and 1940 was that competitive enterprise provided a generally favorable climate. It is true that natural resources were plentiful and that the population was growing rapidly both in numbers and in skill. But what we had to a unique degree here was an atmosphere which favored risk-taking, fostered the vast capital investment necessary to harness and apply mechanical energy, and provided the incentives necessary to put capital and inventiveness to work.

No other economy has equalled ours in the ability to produce more and more with continually diminishing human effort. The test it now faces is whether it can eliminate the ups and downs in production and employment that have gone along with it. But an abundance of evidence indicates that we ran into trouble after 1929 not because we developed too many labor-saving machines but because we didn't adjust our economic mechanism to keep the process going.

The key importance of mechanization is indicated by the fact that the increase in national production since 1860 closely parallels the increase in use of mechanical power. Between 1860 and 1940, both volume of production and use of energy multiplied about 11 times. It is clear that, in order to keep our standard of living rising, we must continue to apply more and more power to production.

Chief advantage of mechanical energy is, of course, its low cost. Electric energy is now delivered for as little as a cent a horsepower, while the same amount of human energy costs $10.

And there are other important advantages. Mechanical energy can be delivered in greater concentrations than any other form. It is also more convenient, compact, mobile, and controllable. Consolidated Edison in New York delivers enough electricity in a day to do the work of 3 million draft horses.

These advantages are now so universally accepted that it's hard to realize how recently we left the horse and buggy era. At the turn of the century, animals and men provided more than half the energy used in production and transportation. It wasn't until World War I that trucks replaced horses in local hauling and tractors began to invade the farms. Here is how the use of mechanical energy has grown since 1850:

	Total Energy Output (Billions of Horsepower-Hours)	Percent Supplied by:		
		Mechanical Energy	Humans	Animals
1850	17.6	6	15	79
1860	25.2	7	14	79
1870	27.8	12	15	73
1880	39.9	17	14	69
1890	61.1	28	12	60
1900	82.9	38	10	52
1910	131.4	57	8	35
1920	197.4	73	6	21
1930	238.3	84	5	11
1940	289.4	90	4	6
1950	410.4	94	3	3
1960	489.8	96	2	2

PRODUCTIVITY IN THE FUTURE

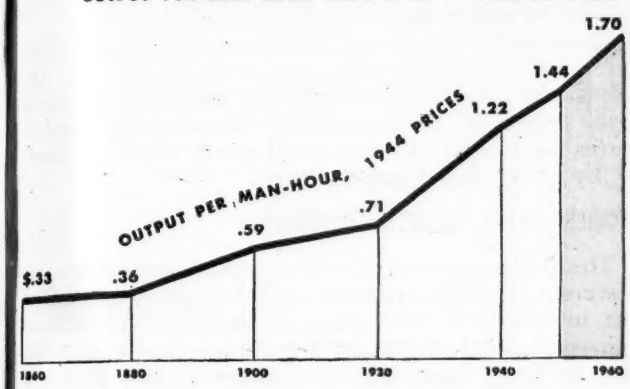
Any attempt to predict future developments in productivity is complicated by the fact that the changes do not occur at an even rate. Between 1850 and 1940 the average increase in output per man-hour was 18% per decade. But the changes varied all the way from 3% between 1870 and 1880 to 42% for the decade ending in 1940. There is, therefore, no simple way to extend past trends to obtain a foolproof figure for productivity at a future date.

For purposes of this study, however, the 20th Century Fund assumes that the average rate of increase since 1850 may be projected to estimate output per man-hour in 1950 and 1960. Thus, output per man-hour works out to $1.44 in 1950 and $1.70 in 1960 as against $1.22 in 1940 (all in 1944 dollars).

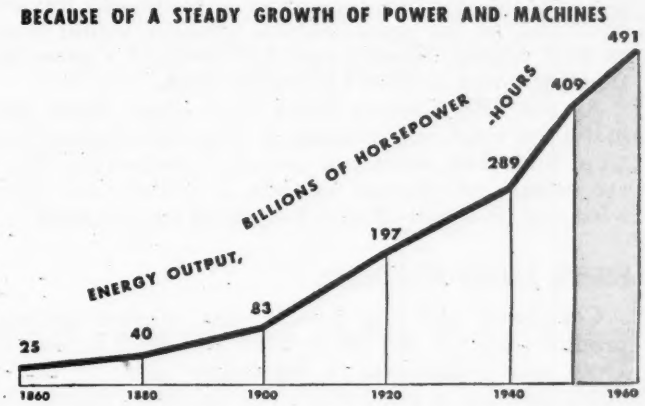
As the Fund points out, this is a critical assumption, and it is further complicated by the fact that there is a wider possibility of error in this estimate than in most of the others in the study. If, for example, it is assumed that productivity will increase at the pace set from 1920 to 1940 which averaged 36% per decade, then 1960 production would be about double the 1940 level instead of only 157% of it, as the 20th Century Fund estimates.

A CENTURY OF ECONOMIC PROGRESS 1860–1960

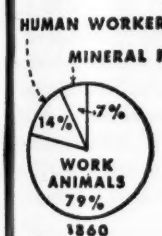
OUTPUT PER MAN-HOUR SHOULD BE 5 TIMES AS GREAT

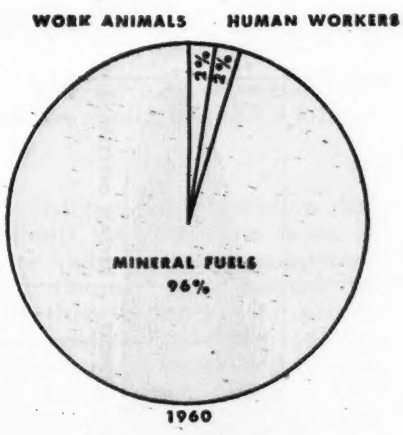


BECAUSE OF A STEADY GROWTH OF POWER AND MACHINES

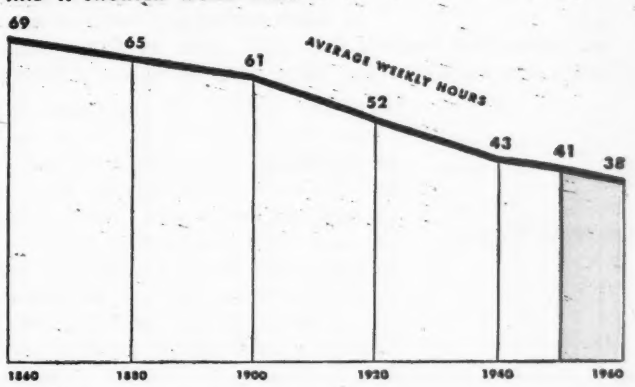


SO WITH LESS EFFORT

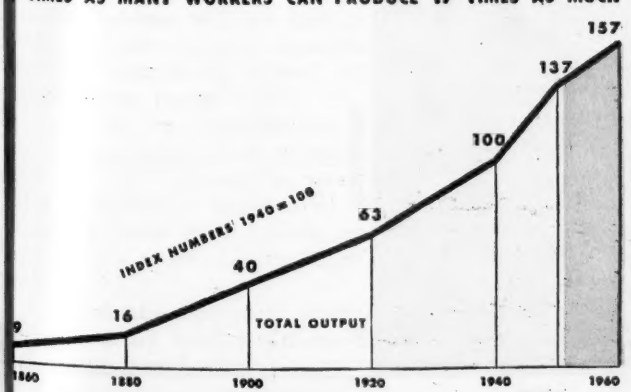




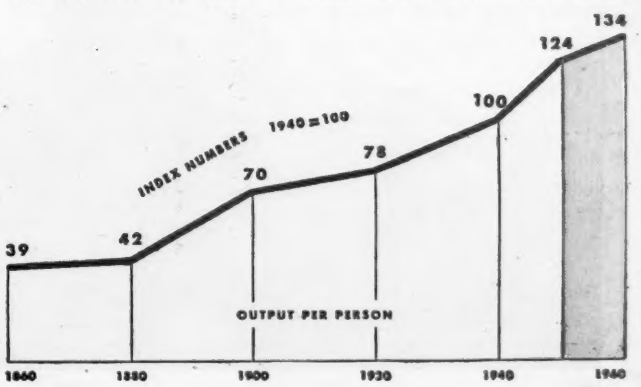
AND A SHORTER WORK WEEK



9 TIMES AS MANY WORKERS CAN PRODUCE 17 TIMES AS MUCH



AND PROVIDE 3½ TIMES AS MUCH OUTPUT FOR EACH PERSON



TOTAL NATIONAL OUTPUT

The potential volume of goods and services in 1950 and 1960 can be determined by simple arithmetic, using the assumptions outlined on the preceding pages. Of an estimated population of 145 million in 1950, about 60 million persons will be in the labor market and 57 million of them will have jobs if we succeed in keeping business activity at a high level.

This many people would work 121 billion man-hours. With output per man-hour estimated at $1.44 (in 1944 dollars) the total value of goods and services produced, or the gross national product, would come to $177 billion. Similar calculations yield a gross national product of $202 billion for 1960.

As the 20th Century Fund emphasizes, these estimates are neither a forecast of actual production nor an appraisal of maximum potential production. They are merely an attempt to show in dollars and cents what can be achieved with high-level employment.

HIGHER LIVING STANDARDS

Compared with any prewar year, a gross national product of $177 billion in 1950 and $202 billion in 1960 would represent a handsome gain. It would make possible a substantial rise in living standards. In 1950 we would produce a fifth more than in 1941.

CAN TURN OUT ENOUGH GOODS AND SERVICES . . .

However, the volume of goods and services turned out in 1950 would be only slightly higher than present production. This is because the number of persons at work today is 2 million above the estimated normal for 1950, and average weekly hours are higher than they will be then. Almost a million and a half of the emergency workers drawn into the labor force during the war are still at work and unemployment is lower than the figure assumed for 1950.

The estimates of 1950 and 1960 gross national product, as well as the figures for past years used in the chart, are expressed in 1944 prices. This is not a prediction that the price level will settle down to the 1944 level which would involve a drop of 18% in the cost of living and 26% in wholesale prices. It is merely a device to eliminate price fluctuations so that the figures will show only the actual changes in the physical volume of production.

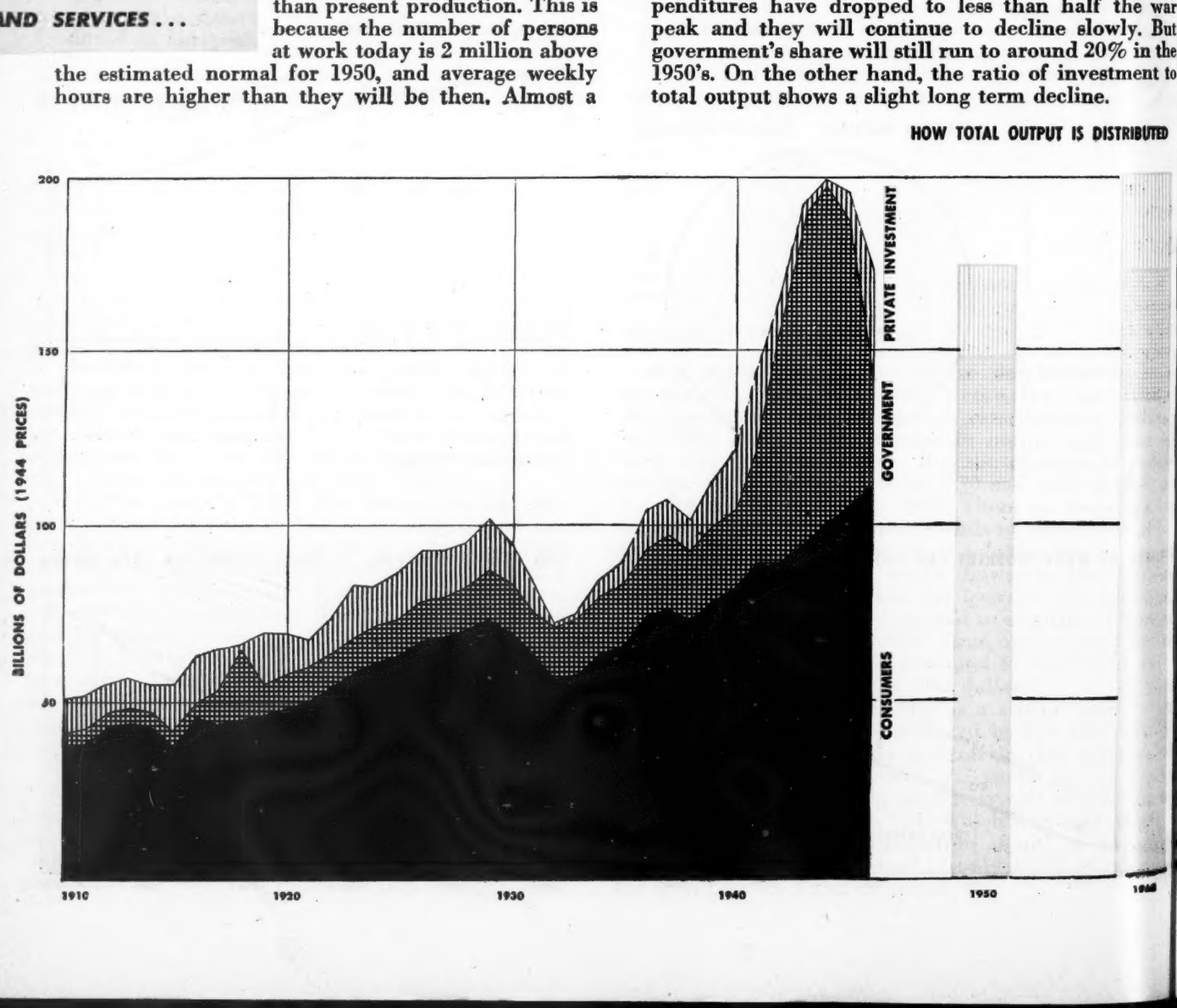
Gross national product measures the total market value of everything the nation produces. All the goods and services produced are absorbed in one of three ways: by consumer expenditures; by expenditures for investment in capital goods or inventories; or by government expenditures.

HIGHER TAXES, LESS INVESTMENT

The division of total output among consumers, investment, and government will be somewhat different in 1950 and 1960 than in the past. About two-thirds of total output will go into consumer goods and services. This is about the same as the proportion in prewar years.

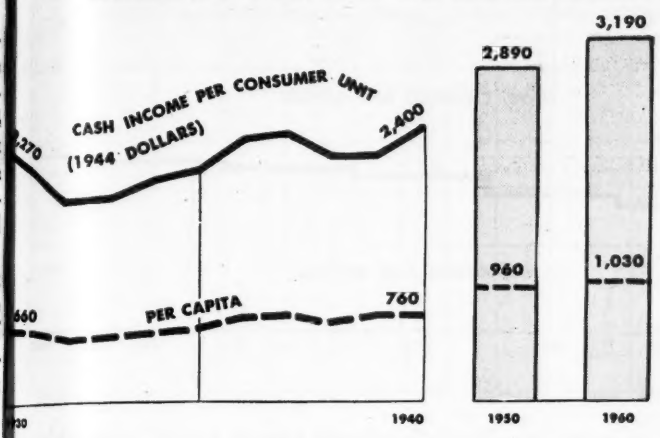
Government's share will continue to grow, however. It rose from 11% of total output in 1929 to 17% in 1940. At the peak of the war effort, half of all production went to Uncle Sam. Government expenditures have dropped to less than half the war peak and they will continue to decline slowly. But government's share will still run to around 20% in the 1950's. On the other hand, the ratio of investment to total output shows a slight long term decline.

HOW TOTAL OUTPUT IS DISTRIBUTED

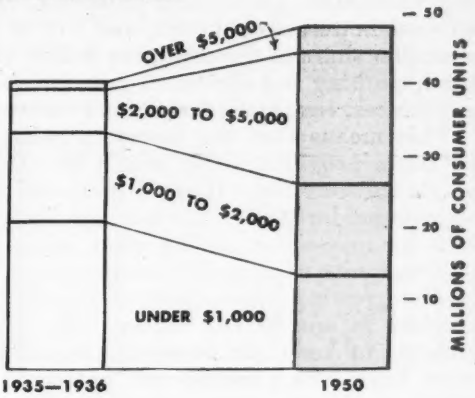


MORE CONSUMER PURCHASING POWER

CONSUMERS WILL BE ABLE TO BUY 50% MORE THAN IN 1930'S



EVERY OTHER FAMILY... INSTEAD OF EVERY SIXTH FAMILY... WILL HAVE $2,000 OR MORE TO SPEND.



CONSUMER INCOME

U. S. business can look forward to a 1950 consumer market twice as large as in the worst year of the depression, half again as large as in 1929, and one-fifth larger than in 1941. That is the major conclusion of the 20th Century Fund's analysis of consumer purchasing power. Here are the steps by which it arrives at that conclusion:

1. With gross national product at $177 billion in 1950, past experience indicates that income payments to individuals would run to $138 billion.

2. Income tax rates are assumed to equal the 1942 schedules, so individuals would pay $11 billion in taxes (as against $19 billion in 1946).

3. Savings are estimated at $12 billion, or about 9% of income after taxes.

4. Subtracting taxes and savings, consumer purchases of goods and services would total $116 billion.

LOWER SAVINGS

Many experts would criticize the assumption that savings will amount to only 9% of income. Some of them look for a ratio as high as 20% in prosperous postwar years. The 20th Century Fund justifies the use of a low figure on three grounds: (1) people built up reserve of savings during the war; (2) expanding social security will reduce the need to save for old age; and (3) taxes will cut into savings. The Fund's estimate of savings plus taxes in 1950 adds up to a higher percentage of income than in prosperous prewar years.

The standard of living won't rise as rapidly as the total income going to consumers, because the increased income will be split up among more family units. But the average consumer unit (a family or a single person living alone) will be a third better off in 1960 than in the 1930's.

Shifts in the distribution of income will be even more important, from a marketing standpoint, than the general increase in over-all consumer income. More consumer units will be in the over-$2000 brackets than ever before and this group will be receiving a much larger share of total consumer income.

Part of the apparent increase in income is cancelled out by higher prices. To show the actual increase in purchasing power, the figures should be adjusted for an estimated one-third increase in the 1950 price level over that of the mid-1930's. This would mean that a $2,650 income in 1950 would buy no more than a $2,000 income in 1935-36. Even if this adjustment is made, the resulting figures still show a striking upward shift.

Income Class	Consumer Units in Millions		Cash Income in Billions	
	1935-56	1950	1935-36	1950
Total	39.2	47.9	$85.0	$135.0
Under $1000	20.8	13.0	17.0	7.7
$1000-2000	12.2	12.9	28.1	21.5
$2000-5000	5.5	18.2	23.8	62.1
Over $5000	0.7	3.8	16.1	43.7

FOR CONSUMERS...

In addition to dollar income, shown in the above table, consumers also receive "income in kind"—food and fuel produced by farmers for their own use, board and lodging received by domestic servants. Such income will have a value estimated at $3.3 billion in 1950, most of which will supplement the $7.7 billion received by those in the "under $1000" bracket.

The urban market will continue to be far more important than the rural market. Consumer units in cities will receive cash incomes of $3,445 on the average in 1950, more than twice the farm average of $1,635 and almost twice the small town average of $1,880.

THE FARM MARKET

These figures don't provide an accurate measure of the relative importance of the rural and urban markets because rural consumers pay a lot less for food, fuel, shelter and so have more to spend for other things. If there were any way to adjust for these things, the figures would show a smaller spread between the two markets, but the urban market will still be dominant.

All these figures underline a general upgrading in consumer demands which would accompany high-level production and employment. It will have a profound effect on marketing practices. The average person will eat better, dress better, and live in a better house with better equipment. And he will have more money to spend for travel, recreation, and luxuries.

CONSUMER MARKETS

The improvement in living standards during the 1950 decade will lead to important changes in the way consumers spend their dollars. Even though they will eat better, dress better, and live in better houses, a smaller share of the consumer dollar will be spent on food, clothing and shelter. A growing share will go for appliances, furniture, travel, and recreation.

This means that the fastest growing markets will be those providing what might be called "optional" goods and services — things which add to comfort and enjoyment but which are not strictly necessary. Markets for necessities, on the other hand, will expand at a slower rate than total consumer expenditures.

The growing importance of "optional" goods and services is one of the reasons why it's increasingly difficult to keep our economic machine going on an even keel. The purchase of "optional" goods can be postponed with little hardship. So anything that causes people to put off buying a new car, a new house, or a new radio has a far greater effect on production and employment now than it did when the major share of the consumer dollar went for necessities.

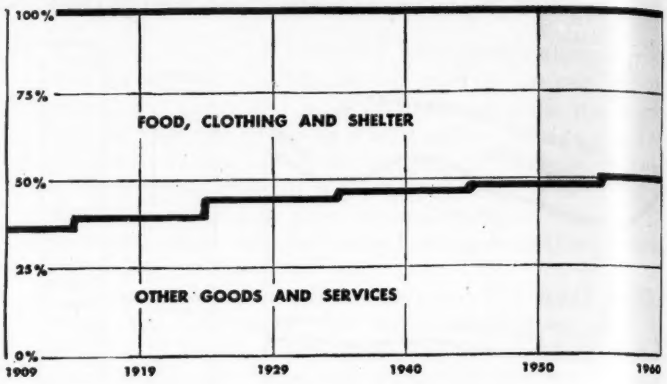
Some of the trends in major markets are summarized in the following sections.

FOOD

Although food is by far the largest item in the consumer budget, its relative importance is declining slowly as living standards rise. People eat the same number of pounds of food they ate in 1909 but the food is better from a nutritional standpoint and easier to prepare. Thus, the trend favors fruits, vegetables, and dairy products as against meat, potatoes, and bread.

More and more food is being processed in factories rather than in consumer kitchens. Improved methods of manufacture and distribution have transformed the luxury foods of yesterday into the standard foods of today. New kinds of processed foods — canned, frozen, and dehydrated — are appearing constantly.

STANDARD OF LIVING YARDSTICK: MORE OF THE CONSUMER DOLLAR GOES FOR THE COMFORTS OF MODERN LIFE



CLOTHING

Three long term trends will shape the clothing market in the future: (1) the shift from home and custom to factory fabrication is almost complete;

WHERE CONSUMER DOLLARS GO

(Figures in Billions of Dollars)

	1909	1919	1929	1940	1941	1950 (1944 Prices)	1960 (1944 Prices)
Total Consumer Expenditures	28.8	60.8	80.3	70.6	80.4	116.2	134.2
Food, Liquor, and Tobacco	9.9	22.3	23.7	21.9	25.3	36.2	41.1
Food	7.4	18.8	19.9	16.4	19.0	27.2	30.8
Liquor and Tobacco	2.5	3.5	3.7	5.5	6.3	9.0	10.3
Clothing and Personal Care	4.4	9.8	12.1	9.8	11.5	16.2	18.7
Housing	6.8	10.1	14.4	12.6	13.3	19.3	21.4
Rent a.	5.5	7.9	11.3	9.1	9.7	14.0	15.4
Fuel	1.0	1.5	1.7	1.7	1.8	2.5	2.8
Electricity	0.1	0.3	0.6	0.9	1.0	1.6	1.8
Household Equipment and Operation	2.8	6.2	10.6	8.7	10.3	15.0	17.4
Appliances	0.2	0.4	0.8	1.0	1.3	1.8	2.4
Consumer Transportation	1.6	5.2	8.6	7.3	8.6	12.7	16.4
Autos and Private Planes b.	0.6	3.5	6.0	5.7	6.8	9.6	12.7
Local Bus and Street Car	—	—	0.8	0.7	0.8	1.5	1.5
Intercity Bus	—	—	0.1	0.1	0.2	0.2	0.2
Airlines	—	—	c.	c.	c.	0.1	0.5
Railroads	0.4	0.8	0.6	0.3	0.3	0.4	0.3
Medical Care, Insurance, and Death Expenses	1.1	2.8	4.5	4.7	5.2	7.7	8.7
Recreation	0.9	2.1	3.8	3.3	3.7	5.7	6.9
Radio and Television Sets	0.2	0.7	1.0	0.6	0.8	1.1	1.3
Private Education, Religion, and Welfare	1.2	2.2	2.7	2.3	2.4	3.4	3.7

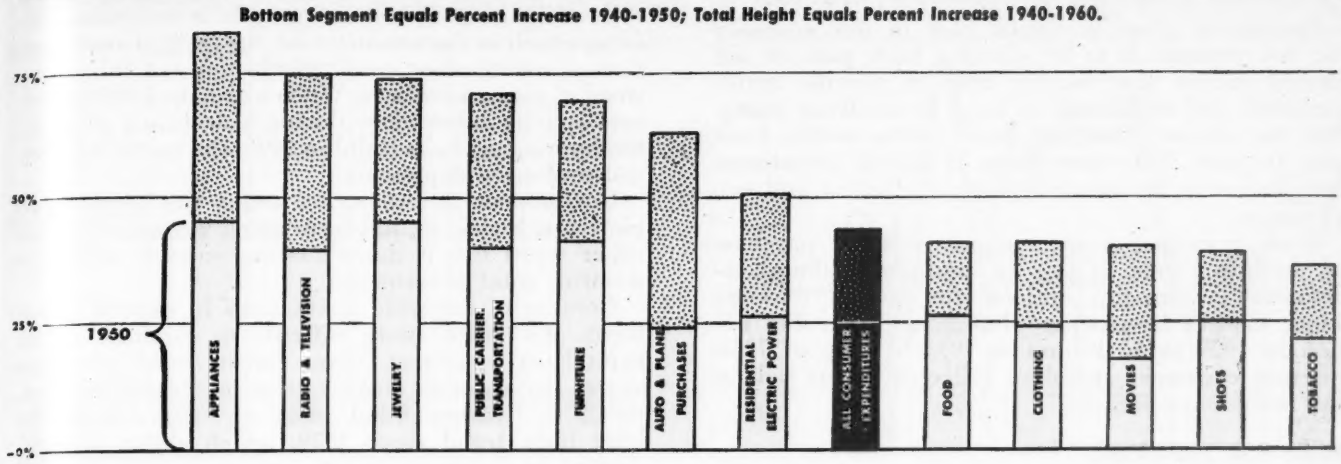
a. Includes Estimated Rent for Owner-Occupied Homes.

b. Includes Original Cost and Operating Expenses.

c. Less than $50 Million.

CONSUMER MARKETS IN 1950 AND 1960: Percent Increase in Sales Over 1940

Bottom Segment Equals Percent Increase 1940-1950; Total Height Equals Percent Increase 1940-1960.



(2) synthetics, chiefly rayon and nylon so far, are replacing cotton, wool, and silk at an accelerating pace; (3) there's greater standardization of styles and a trend to lighter and simpler clothing.

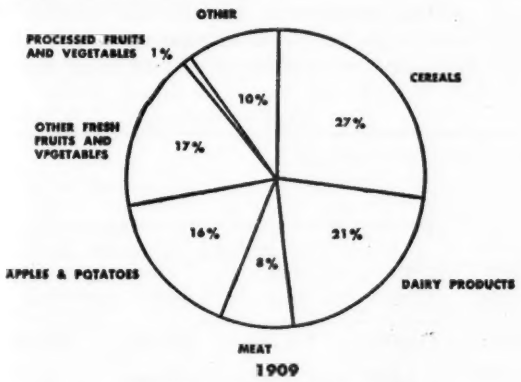
In 1909 consumers spent 14% of their income for clothing but by 1940 the ratio had reclined to 12%. However, this long run decline may be halted or reversed. The migration from farms to cities, the upgrading of incomes, and the growing demand for sports clothing will increase clothing expenditures.

HOUSING

The decline in the relative importance of housing expenditures — from 24% of consumer dollars in 1909 to less than 18% in 1940 — is expected to continue. The reason is that people feel they get more value for their dollars in other things than housing. Nevertheless, the housing market should be much larger in the 1950's than in the 1930's because much of our housing needs to be repaired or replaced.

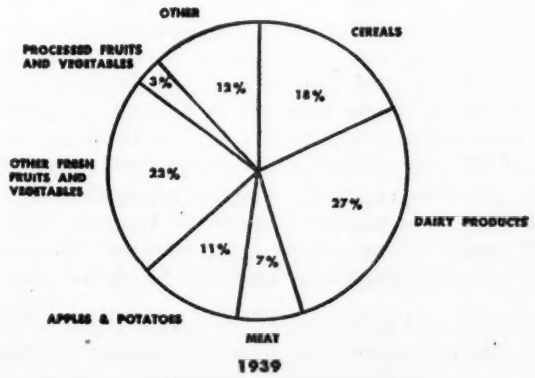
A Census survey in 1940 showed that 16 million of the nation's 37 million dwelling units needed to be replaced or needed major repairs. The 20th Century Fund estimates that the provision of adequate housing for everyone by 1960 would involve building 20 million new units and rehabilitating 5.4 million at a total cost of $115 billion (1944 prices). The Fund also estimates that we will fall 15% short of this goal even with continued high-level employment.

OUR CHANGING DIET: MORE MILK, FRUITS AND VEGETABLES
LESS MEAT, POTATOES AND BREAD



1909

1880 POUNDS OF FOOD PER PERSON



1939

1882 POUNDS OF FOOD PER PERSON

HOUSEHOLD EQUIPMENT

More and more of the consumer dollar has gone for household equipment in the past four decades, largely because of the development of labor-saving appliances. The outlook is for a continuation of this trend. New appliances are being developed; and the large number of new houses slated to be built in the next few years, the wartime and postwar boom in the number of families, and the migration to the cities should add to appliance demand. The same factors should brighten the outlook for furniture, rugs, and other household items.

Some appliance markets may be saturated by the 1950's, however. A few years of high production would fill our homes with refrigerators, for example. However, replacement demand would run to 2.7 million units in 1960 and there would be a demand for 1.3 million refrigerators to equip new houses, so the market would still be bigger than in 1941 when 3.6 million were sold. However, new products must be developed if the industry is to keep up the pace it has set in the past.

TRAVEL

In 1916 the average person traveled 400 miles. By 1940 the average had grown to 2,400 miles, chiefly because of the rise of the automobile. The 20th Century Fund expects this growth to continue because as their incomes rise people spend more money traveling.

A good share of the increased spending will go to purchases of cars and planes. The Fund estimates that there will be 36 million cars on the road and 100,000 private planes in the air in 1950. The auto industry would be able to sell 5 million new cars a year after 1950 — 4 million for replacement and a million for population growth.

CAPITAL INVESTMENT

Investment plays a crucial role in our economy for two reasons. It is by plowing back part of our annual output that we are able to provide better machines and equipment to keep productivity rising. But the amount ploughed back varies widely from year to year. This unevenness of capital investment contributes to the instability of production and employment.

Because capital investment involves the purchase of durable goods, it can be postponed almost indefinitely when the outlook for profits darkens. Thus, capital investment plummeted from $18 billion in 1929 to $5 billion in 1933, a drop of 72%, whereas consumer spending fell only about half as fast in the same period.

MORE FOR EQUIPMENT

There has been an important shift in the relationship between construction and equipment, the two major types of investment. Before World War I, construction made up around three-fourths of total investment but the ratio declined to less than half in 1935-39. Part of the decline is, of course, explained by the fact that the depression left us with ample plant capacity but provided an incentive to buy more efficient machines to cut costs. Nevertheless, there is a well-defined trend towards allocating an increasing proportion of investment to equipment rather than to plant construction.

CAPITAL INVESTMENT . . .

A little less than two-thirds of total investment goes into industrial plants and equipment. Housing and other consumer construction (hospitals, schools, churches) averaged 27% of total investment during the interwar period. Housing fell from a peak of $6 billion in 1926 to $4.7 billion in 1929 and $600 million in 1933; and it had recovered only half the 1926 volume by 1940.

While other types of investment follow the ups and downs in general business, investment in housing construction follows a cycle of its own. This housing cycle is determined by factors such as the vacancy rate, the level of rents, and that of construction costs, which may not follow the trend of general business. When a drop in general business activity takes place during a declining phase of the housing cycle, as it did in 1929, the result is a deep and prolonged depression.

Government investment, of which the largest component is highways, has been much more stable than other types but it doesn't swing enough weight to stabilize total investment.

Because of the wide fluctuations in capital investment, it's much more difficult to estimate future capital expenditures than future consumer purchases. In order to make a relatively stable forecast, the 20th Century Fund bases its estimates on the long term trend since 1879, which shows a slight decline in the share of total output going to capital investment. Thus, investment under conditions of stable prosperity in the 1950 decade is estimated at 16% of total output as compared with a ratio of more than 18% in the late 1920's. On this basis, estimated capital expenditures work out to $28 billion for 1950 and $33 billion in 1960. Our ability to maintain high employment and rising living standards will depend in large measure on our ability to invest that much profitably in new machinery and buildings.

CAPITAL NEEDS

Analysis of our capital needs lends little support to the idea prevalent during the 1930's that we had reached economic maturity so that there was no way to invest as much as we had in earlier decades. No one has ever made an estimate of how much it would cost to modernize our industrial plant, which is valued at around $200 billion at prewar prices. If as much as a third of it needs to be replaced or rehabilitated, around $100 billion (current prices) of additional investment will be required.

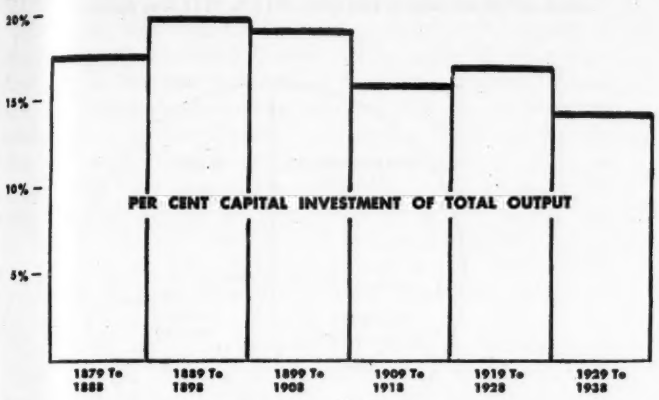
In addition, huge amounts of money need to be invested in housing and public works to raise the serv-

WHERE INVESTMENT DOLLARS GO

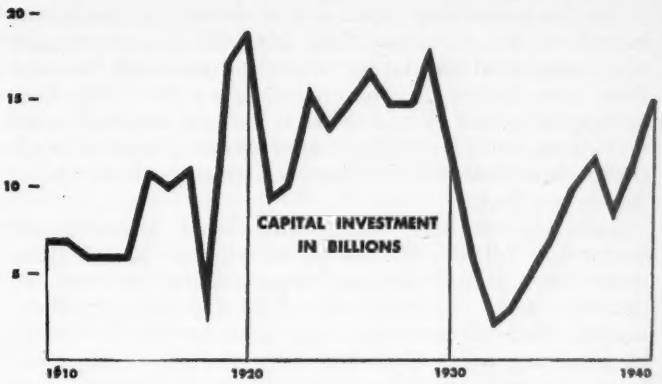
(Figures in Billions of Dollars)

	(Annual Averages)					(1944 Prices)	
	1920-1924	1925-1929	1930-1934	1935-1939	1940-1944	1950	1960
Total Capital Investment	$12,428	$17,186	$8,215	$10,445	$12.340	$27,700	$33,000
All Industries	7,570	10,112	5,272	6,889	8,089	17,800	21,125
Manufacturing	1,996	2,362	1,074	1,610	3,731	4,200	5,025
Food	261	357	194	244		228	273
Textiles	227	212	92	117		175	210
Steel	138	188	110	192		853	1,021
Autos	105	150	78	146		369	441
Chemicals & Petroleum	70	95	68	142		928	1,111
Machinery	—	—	—	28		180	216
Other	510	625	213	409		1,462	1,750
Transportation	1,797	2,303	1,277	1,822	805	4,300	5,100
Commercial	1,196	1,940	777	719	833	1,950	2,300
Utility	693	999	483	422	780	1,500	1,625
Other	1,888	2,508	1,661	2,316	1,940	3,950	4,700
Consumer Construction	3,806	5,557	1,547	2,256	2,912	7,200	8,255
Government Construction	1,052	1,517	1,396	1,299	1,338	2,700	3,620

OVER THE YEARS ABOUT 1/5 OF TOTAL OUTPUT IS PLOWED BACK AS INVESTMENT



BUT THE AMOUNT PLOUGHED BACK VARIES GREATLY FROM GOOD YEARS TO BAD, ACCENTUATING THE SWINGS OF THE BUSINESS CYCLE



ices provided merely to adequate levels. The 20th Century Fund estimates that the cost of a 15 year program to modernize our city streets and rural highways would run to $40 billion. To bring the nation's housing up to minimum standards of health and decency by 1960 would cost $115 billion. To conserve our natural resources and develop our water power would cost $27 billion over a 15 year period.

There seems to be little question that needs exist for all the capital investment we can make for a long time to come. The behavior of investment in the past strongly suggests that the problem is not one of lack of needs but one of finding ways to add to our capital in an orderly fashion. Capital investment has followed the boom and bust route in the past; what is wanted is a high but steady rate of investment.

WARTIME INVESTMENT DEFICIT

Demand for capital goods is stronger right now than ever before, largely because of the backed-up needs arising out of the war. Here is how wartime expenditures for capital goods which can be used in peacetime production compared with expenditures in the last 5 years of both the 1920's and 1930's: (Figures in billions of dollars)

	1925-1929	1935-1939*	1940-1944
Total Capital investment	$86	$65	$49
Industrial	51	43	32
Manufacturing	12	10	14
Metals, chemicals, machinery, petroleum	6	6	11
All Other	6	4	3
Commercial	10	5	3
Railroads	5	3	3
Electric power	5	3	3
Consumer Construction	28	14	12
Public Works	7	8	5

* Adjusted to Wartime Prices

Wartime restrictions held investment in all civilian lines far below what would be spent in prosperous peacetime years. Thus, there was a backlog of investment needs at the end of the war which ran to more than $30 billion, if the 1925-1929 demand can be taken as typical. Whatever the precise size of the backlog, it is clearly great enough, when added to the normal yearly demand for new investment, to keep the heavy goods boom going for some time to come. The test of our ability to stabilize capital investment will come later.

There is also a huge foreign demand for American capital. How far we will go toward meeting this depends largely on whether international political and economic conditions are stable enough to make private foreign investment a good risk.

If we invest abroad in the same proportion we did in the late-1920's, our foreign investments will total $1.6 billion during the year 1950 and $1.5 billion in the year 1960. This will mean a net increase in our foreign holdings of $15 billion during the 1950's, raising the total of such holdings to about $25 billion, as against a total of $10.6 billion in 1940.

To make that much foreign investment pay out, an expanding volume of world trade would be required. Foreign nations would have to get enough dollars not only to pay for goods they bought from us but also to pay interest and dividends on U. S. investments. If our overseas investments increase to $25 billion by 1960, annual interest and dividends owed us will run to almost $1¾ billion.

To pay us that much, foreign nations would have to sell much more in the U. S. than ever before. The 20th Century Fund calculates that imports of $7.3 billion in 1950 and $8.1 billion in 1960 would provide other countries with the dollars they need. Imports ran to $2.5 billion in 1940 so we would have to buy 3 times as much abroad to keep expanding our foreign investments.

With good business, U. S. demand for imported goods should be well above prewar. Rising living standards will widen the market for such consumer items as British tweeds and French perfumes. Moreover, we will need to import more raw materials than ever before because we used up our natural resources at a prodigious pace during the war.

NEW INDUSTRIES

The new methods, materials, and products developed during the war may well have a more profound and lasting effect on future capital requirements than the backed-up demands accumulated in wartime. Here are some of the wartime developments which may have important peacetime applications: new chemical processes and products including synthetic rubber, plastics, synthetic fibers and fabrics; new food products and new methods of food processing; new uses for glass, plywood, and the light metals; tremendous advances in aviation; and new applications of atomic energy and fissionable products in power production and medicine.

Large capital expenditures will be required to push these developments further and adapt them to civilian use. New businesses and perhaps entire new industries will grow up, adding to the demand for capital goods for many years.

THE COST OF GOVERNMENT

To the traditional certainty of death and taxes can be added the certainty that the cost of government will take a much larger share of national income than ever before in peacetime. After the Civil War and again after World War I, federal expenditures moved up to a level four times prewar. And it is already clear that World War II is going to have about the same effect.

In 1940, federal, state, and local governments spent $19 billion, of which a total of $2.2 billion went for national defense, veterans, and interest on the war debt. By 1950, the 20th Century Fund estimates that all governmental units in the U. S. will be spending more than $45 billion. Federal expenditures are estimated at $27.6 billion in that year as against $9 billion in 1940.

Part of the increase is explained by higher postwar prices. Adjusting for price changes would reduce the 1950 figure from $45 billion to $33.5 billion. This is still 80% above the 1940 level. Increased expenditures for public works, social insurance, and schools explain another small part of the rise.

But costs arising out of the war are by far the most important factor. Military and veterans' expenditures and interest on the war-swollen national debt will add up to over $17 billion in 1950. This is only 10% less than total government expenditures in 1940.

The only major category of government expense which would be lower in 1950 is welfare. With high-level employment and more social insurance, relief and other welfare costs should run to $2.5 billion in 1950 as against $3 billion in 1941.

The following paragraphs describe important trends in the major items of government expense.

MILITARY

The 20th Century Fund assumes that we will maintain an armed strength of 2 million men (including trainees) and that it will cost $3,300 to equip and maintain each man, so total military expenditures will run to $6.6 billion. But even if we decide to maintain a smaller armed strength, the total cost might easily be at least $6.6 billion because the present per serviceman cost of over $6,000 a year may not decline.

AND GOVERNMENT . . .

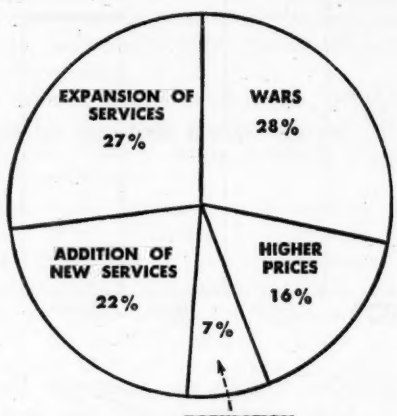
VETERANS

It will cost at least $2.9 billion to take care of veterans in 1950 even if benefits are not increased. That's 5 times the 1941 cost. Pensions for World War I veterans rose steadily from $116 million in 1924 to over $300 million in 1945. That rise will continue for another 20 years. By far the largest expense will be for World War II pensions which are already costing $900 million. Disability and death benefits will cost about $1¾ billion in 1950; hospitalization will add another $250 million; and insurance $150 million.

SOCIAL SECURITY

Future expenditures for social security will depend on whether steps are taken to extend coverage and liberalize benefits. Over 60 million people are now covered so the cost is certain to increase rapidly as more of them begin to draw payments. With high-level employment in 1950, estimated old age and unemployment benefits under the present system would run to over $5 billion. Expansion of benefits, as recommended by the Social Security Board, would raise the cost to over $9 billion.

WHY THE COST OF GOVERNMENT HAS INCREASED. The $25.6 billion increase in cost from 1913 to 1941 was due to:



PUBLIC WORKS

Even an economy-minded Congress is almost certain to go along with expenditures for highways, airports, waterways, flood control and conservation. Thus, an increase in expenditures for transportation and natural resources from less than $2.5 billion to over $5 billion in 1950 seems probable.

SCHOOLS

Education ranks third among all government expenditures. In 1941 we spent almost $2.5 billion—10% of all government dollars—on schools. Teachers' salaries account for almost three-quarters of the total cost so the trend towards higher salaries will boost the nation's bill for education.

WHERE TAX DOLLARS GO

(Figures in Billions of Dollars)

				(1944 Prices)	
	1913	1932	1941	1950	1960
All Government Expenditures	2.5	12.4	23.1	45.5	50.7
Federal	0.7	4.3	12.9	27.6	28.6
State	0.2	1.8	3.6	7.0	9.3
Local	1.6	6.3	6.6	10.9	12.8
Military	0.27	0.7	6.1	5.6	6.6
Veterans	0.18	0.8	0.6	2.9	3.2
Interest	0.15	1.3	1.7	7.9	8.1
Social Insurance	—	0.2	1.9	7.7	8.7
Welfare & Health	0.31	1.5	4.1	4.0	4.1
Education	0.65	2.5	2.7	3.7	4.3
Public Works	a.	a.	a.	5.6	7.1
Transportation	0.40	1.9	2.0	1.8	2.7
Natural Resources	0.03	0.6	1.4	1.2	1.1
Police & Fire	0.19	0.7	0.7	1.0	1.1
Other	0.40	2.4	2.0	3.0	3.6

a. Included in other groups.

NATURAL RESOURCES

The war left the U. S. with a depleted supply of most natural resources, and with critical shortages of some of the most essential minerals. Nevertheless, lack of natural resources should not be a limiting factor on our productive capacity. With relatively free access to world markets, we should be able to get all the raw materials we need. And, even if we were denied access to world markets, we could use our low-grade reserves and develop substitutes without causing a prohibitive reduction in our living standards, though everyone would feel the effects in one way or another.

The U. S. economy consumes about a billion and a half tons of raw materials each year, or about 11.5 tons per person. Of this 3.5 tons are coal, 1.5 tons are petroleum, and iron and copper ore each contribute about a half a ton. In 1939 the value of unrefined minerals output was $4.2 billion and 2% of all workers were engaged in mining or lumbering.

FUTURE REQUIREMENTS

The level of industrial production projected by the 20th Century Fund would raise minerals requirements a third above 1940 by the year 1950 and 50% above 1940 a decade later. Here is how natural resources requirements in the 1950 decade would compare with 1940 and the wartime peak: (Index numbers, 1940 equals 100)

	Wartime Peak	*1950*	*1960*
All minerals	138	133	151
Metals	157	117	126
Fuels	130	141	164
Other	141	128	142
Lumber	126	93	76
Electric Power	159	173	224
Manufactured Gas	120	94	75

The capacity of our supplies of natural resources to support future levels of output cannot be determined with any great accuracy. It will depend on the size of our reserves and on our ability to use supplies more economically and develop substitutes.

H THE OURCES AILABLE . . .

Because there is no way to measure these factors with any degree of precision, all estimates of the number of year's supply are subject to wide errors. However, such estimates are useful in directing attention at those resources where every effort should be exerted to develop new supplies, substitutes, and more economical methods of use.

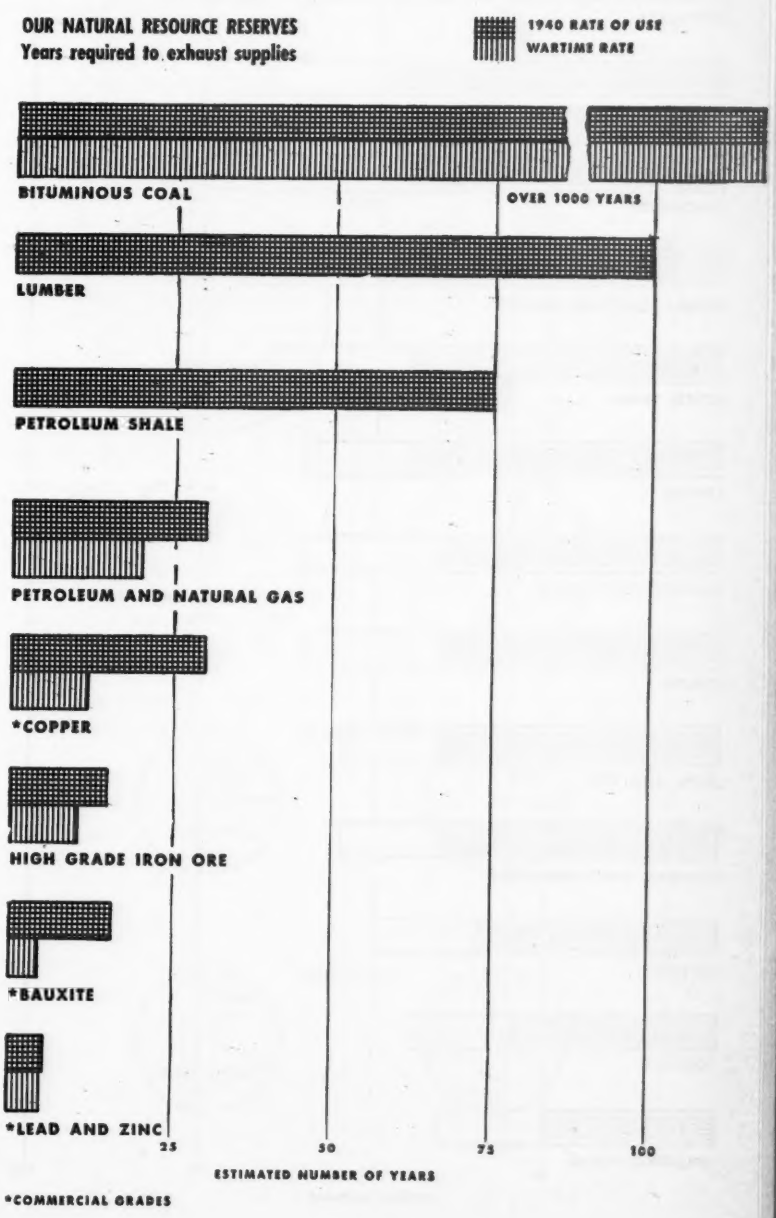
BIGGEST PROBLEMS: LEAD AND ZINC

Commercial grades of zinc, lead, and bauxite will be exhausted before 1960 even if the rate of use is cut to half the wartime rate. Supplies of petroleum and natural gas — which furnish 40% of our energy — will last longer than 20 years but their partial depletion will raise many technical and economic problems long before that time. Possible exhaustion of high-grade deposits of such minerals as iron and copper in the foreseeable future will stimulate development of processes to use low-grade deposits.

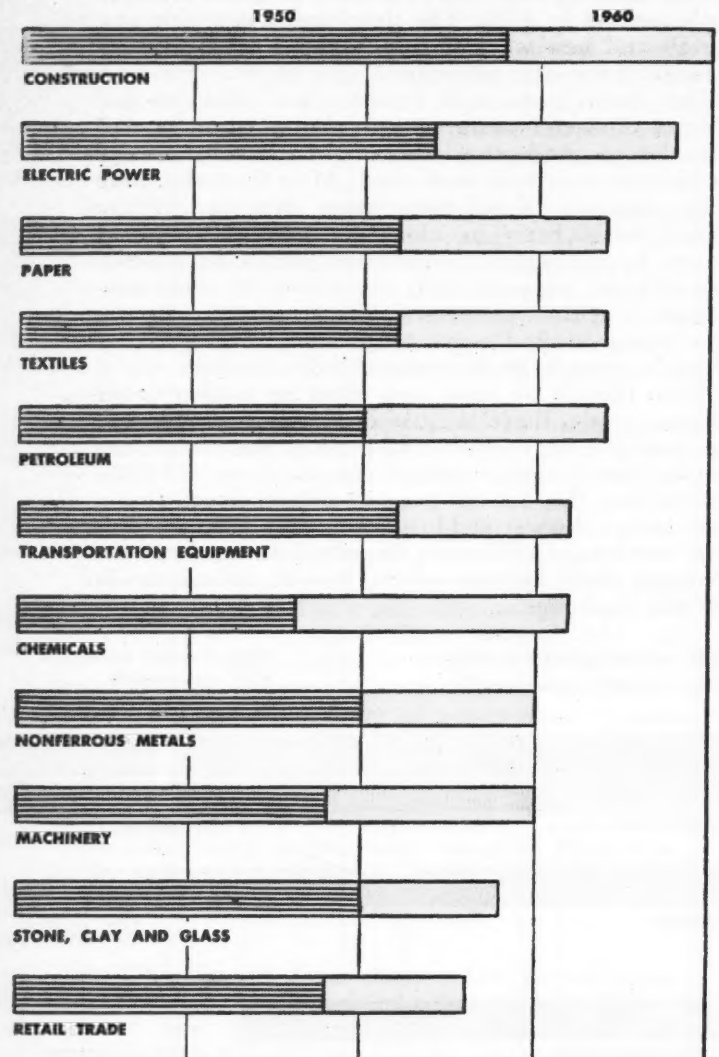
We have been discovering more and more ways to stretch our supplies of natural resources, however. In the case of tin, the electroplating process saves 50% of the tin used in tinplate production. The electric power industry uses less than 40% as much coal per kwh now as in 1920. The development of new materials and new ways of using old materials also expands our resource capacity.

Our bituminous coal reserves are adequate for over a thousand years even at the wartime rate of use, though production costs might rise substantially as inferior coal beds were used. After that, there are huge deposits of sub-bituminous coal and lignite which could carry us along for another thousand years. In comparison, maximum petroleum reserves are minute, adequate only for about 30 years consumption at the current rate. That is why the experts are trying to find ways to produce oil from coal cheaply enough to be commercially feasible.

Even though we have been using up lumber faster than it grows, there is little doubt that enough will be available in the future to meet at least minimum needs. Annual timber growth runs to about 32 billion board feet. But we cut over 40 billion board feet a year before the war and lost another 6 billion through fire, insects, and disease. An adequate conservation program could increase annual growth enough to offset this depletion.



PRODUCTION PROSPECTS: Estimated Percentage Increase in Industrial Activity Over 1940



INDUSTRIAL CAPACITY

At the end of World War II U. S. industry found itself with surplus capacity in some lines and serious deficiencies in others. There was more than enough aircraft, machine tool, and synthetic rubber capacity but not nearly enough sheet steel, copper, or electrical machinery capacity to meet pent-up demands.

War experience showed, however, that industrial capacity can be expanded enormously in a few years, given the need and the funds. Thus lack of industrial capacity should not prove a bottleneck to meeting the demands of consumers in the 1950 decade.

A rough estimate places our total investment in industrial facilities (manufacturing, mining, transportation, and distribution) at $200 billion. Just how much capacity industry as a whole, or any given industry, has is impossible to measure.

Capacity is a most elusive concept. In a technical sense, the capacity of an industry is the combined production of all its plants working 24 hours a day, 365 days a year, less an allowance for repairs, breakdowns, and other technical factors. Actual capacity is far less, however. Some facilities are obsolete or high-cost. Supplies of raw materials and components may be insufficient to keep assembly plants running full-steam. Moreover, demand for many products isn't great enough to support round-the-clock production.

PLENTY OF CAPACITY

During the past quarter century, however, experience shows that we have had more than enough overall capacity, and more than enough capacity in almost every industry, to meet all demands. An extensive study showed that even in 1929 only the steel and machine tool industries were definitely operating at capacity.

The growth of productivity as old machines are replaced with new and more efficient ones and as new techniques are developed is one of the main reasons why industrial capacity more than keeps pace with markets. The depression of the 1930's led to a net retirement of about 5% of total manufacturing facilities but manufacturing plants in 1939 could have turned out a quarter more than in 1929 because productivity was a third higher.

Whenever an industry's output begins to approach technical capacity, it becomes profitable to purchase new and more efficient equipment to replace or supplement existing machines so that a certain amount of excess capacity seems to be inevitable in a free enterprise system.

Estimates of the level of industrial production in different lines under conditions of high-level employment during the 1950 decade are shown in the chart. They assume that past trends will continue so that they give only a rough idea of what would happen to output in each industry. Unpredictable shifts of consumer demand or new product developments might cause a big change in the pattern of industrial production. Such estimates are, nevertheless, useful in that they provide a clue to lines where the largest increases may take place.

None of the projected increases are so large as to tax our ability to provide enough capacity. This is not to say that there will be no bottlenecks because of lack of capacity for certain components, for instance. However, we should be able to make good in short order any deficiencies of that sort that may develop.

DEMANDS VERSUS NEEDS

Despite the substantial increase in living standards which would be possible with high-level production and employment in the 1950 decade, many U. S. consumers will be unable to buy enough of life's necessities to maintain themselves at a health and decency level. Almost 30% of all families would receive less than $1,000 a year cash income and one-third of this group would receive less than $500.

The 20th Century Fund asked a series of experts to estimate the quantities of food, clothing, housing, medical care, and other things needed to provide a standard of living at a minimum health and decency level. The experts also figured out how much it would cost to bring everyone expected to be below that standard in 1950 and 1960 up to the calculated level. In other words, the estimates show the cost of establishing a "floor" for consumption without disturbing the spending patterns of those who received more than enough income to satisfy the calculated minimum needs.

ESTIMATES OF NEEDS

Any estimate of "needs" must rest upon someone's opinion as to what constitutes "health and decency" in this day and age. In the case of food, the nutritional requirements of a minimum health and decency standard can be determined accurately. In other fields, such as housing and education, even the experts would disagree over what constitutes a minimum standard.

However, what is important is not the precise size of the estimates but their general magnitudes. The conclusion that we would have to spend about 50% more on medical care than we are likely to in 1950 is important even if the experts' appraisals of the deficit range from as high as 60% to as low as 40%.

To fill total needs calculated in this manner would require production of $200 billion of goods and services in 1950 or 13% more than the $177 billion which would be turned out with high-level production and employment. In 1960, estimated production would fall short of needs by 8%. Food accounts for the biggest share of the deficit but needs outrun demand by important margins in housing, medical care, education, and social security.

MEET

MOST ALL

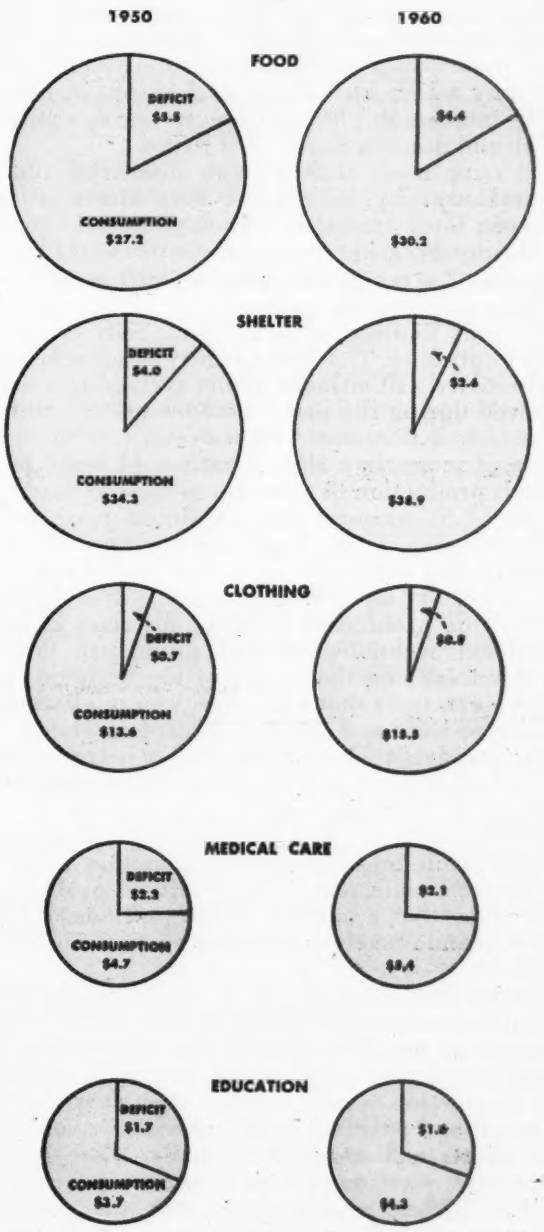
R NEEDS

To provide nutritionally adequate moderate-cost meals for those unable to afford them would add $5.5 billion to the $27.2 billion that would actually be spent on food in 1950. This assumes no change in diets of those with adequate incomes despite the fact that many people in those groups do not eat what they should. If we all ate what we needed, we would consume twice as many fresh vegetables as in 1940, half again as much milk, more fruits and tomatoes; and we would eat smaller quantities of sugar, sirups, fats, and oils. This better diet would cost us less than we will actually spend for food in 1950.

So large a portion of our existing housing is unsatisfactory by any reasonable standards that it would take 10-15 years to provide everyone with adequate housing. One of the reasons why we don't have adequate housing is that many consumers cannot afford to pay enough rent to finance it. Estimated expenditures in 1950 for rent (including the estimated rental value of owner-occupied homes) would run to $14 billion as against an estimated need of $16.4 billion.

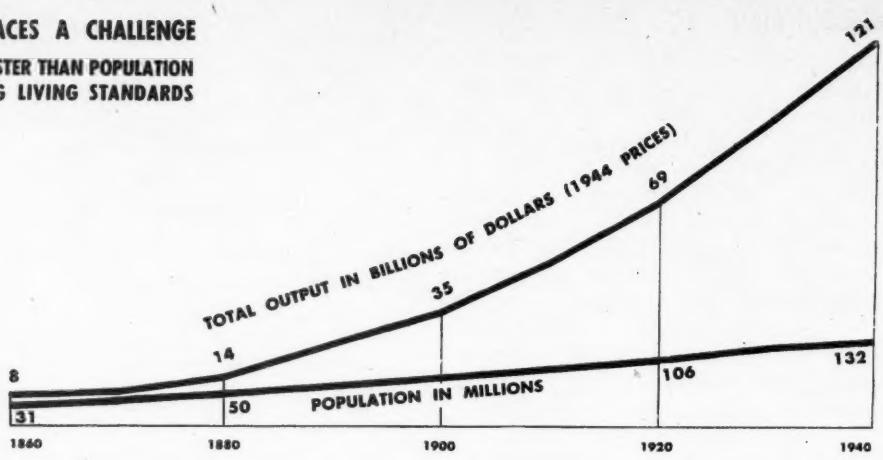
Vast advances in medicine have gone far toward eliminating many diseases and have brought about a steady improvement in the standard of health. However, large numbers of people in the lower income groups cannot afford adequate medical care. Moreover, to supply good medical care for everyone under the traditional fee-for-service basis would cost several times more than consumers have ever spent for medical services even in prosperous years. Development of an effective form of group medicine, however, would make it possible to provide adequate care at a great saving over present costs, according to the 20th Century Fund.

HOW CONSUMPTION WOULD COMPARE WITH TOTAL NEEDS
(Figures in billions of dollars)



THE U. S. ECONOMY FACES A CHALLENGE

PRODUCTION HAS GROWN FASTER THAN POPULATION GIVING PROMISE OF RISING LIVING STANDARDS



The major conclusion of the 20th Century Fund's survey of America's needs and resources is that we have reached a point where we can provide everyone with a decent living and most people with a living which, by any standards other than our own, is positively luxurious. With high-level employment, it would take only a 13% increase in total output in 1950, and an 8% increase in 1960, to lift everyone to a minimum health and decency standard of living.

We have more than enough industrial and agricultural capacity to support that much of an increase in total production. Lack of natural resources should not be a bottleneck, for with world trade on any sort of a reasonable basis we will be able to get all the raw materials we need.

The only limiting factor is the capacity of our labor force to produce. The 20th Century Fund assumes that productivity will advance at the average rate actually achieved during the past 9 decades (18%). But there is no technical reason why we cannot achieve an increase of more than 30%. That would make possible enough production to meet our minimum needs.

The U. S. economy has exhibited two dominant characteristics in the past century. Our productive capacity has expanded at a rate never approached elsewhere. But our economy has also been highly unstable. Our problem is to make the most of our unparalleled technological and productive know-how while minimizing the swings of the business cycle.

If we can meet that challenge, we can eliminate the specter of want and move on toward constantly rising living standards for everyone. Never before in history has a nation been so close to abolishing poverty and meeting the material demands of its citizens.

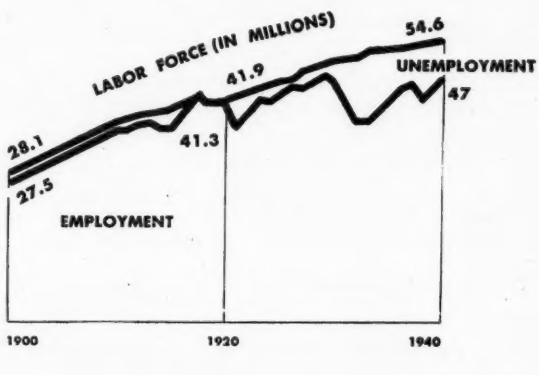
This is not to say that solving the problem of maintaining stable and expanding production would solve all our economic, social, and political problems. Nor is it to say that a solution of the problem of keeping our economic machine running on an even keel is at hand.

In the first place, the U. S. would not be a utopia even if we achieved the kind of high employment and production the 20th Century Fund is talking about. Many perplexing problems of how to best distribute our production would remain. Then there are a host of social and political problems which would still tax our efforts and ingenuity. Finally, there is the all-important question of how to maintain world peace.

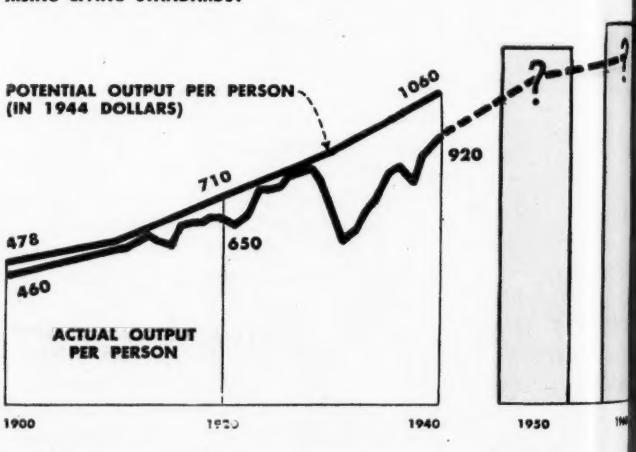
Most people would agree that the problem of maintaining high employment and rising living standards is still far from solution. Our ability to mobilize and direct our economic resources so as to keep our economy running on an even keel has lagged behind our ability to solve technical production problems. Each businessman, each worker, and each consumer must somehow learn to act differently in many ways than he has in the past if we are to solve our number one economic problem.

Just what changes in our economic life will be necessary no one knows. On our ability to find out these things and put them into practice in the next few years depends our success in meeting the challenge which the 20th Century Fund's study underlines. That challenge is that we have within our grasp the ability to eliminate actual want from the U. S. and to provide more and more things for better living for everyone.

BUT THE GROWTH HAS FOLLOWED THE BOOM AND BUST ROUTE INVOLVING LONG PERIODS OF MASS UNEMPLOYMENT



CAN THE ECONOMY PROVIDE STEADY EMPLOYMENT AND RISING LIVING STANDARDS?



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Why the Trend Should Be Down

INSTABILITY of food prices is the uppermost thought among food processors. Softening here, rising there, vigorous demands by distributors for lower prices, and equal insistence by processors that costs cannot be reduced, except by wage cuts or lower farm prices, are important symptoms.

Price instability has been responsible for many deferred postwar plans for new foods. And, of course, it is a reason for reducing inventories.

Hand-to-mouth buying has reappeared. One distributor says he would not buy 100 cases of anything that would not go into consumption in a week. On the other hand, some processors have no surplus beyond their needs. And one company is forced to buy a staple item.

Chain store and supermarket operators say they are losing money on fresh meats, the losses coming on the choice cuts, not on the cheaper ones. One operator has reduced his normal 16-percent markup to 12 percent in an effort to increase volume sufficiently to stop his losses. No one prays for lower prices more earnestly than the distributor, and no one is closer to consumer psychology and pocket books than he.

Price increases in recent months have not been in the luxury lines but in the "flour, molasses and shortenin'" items—as a Southern distributor quaintly phrases it.

Difficulty of Climbing Down

Alonzo E. Taylor of General Mills once stated: It is easy to climb up to a plateau of higher prices, but it is extremely difficult to climb down—as difficult as descending a cliff where hand-holds and toe-holds are few.

Does price instability portend the imminence of the long predicted postwar business recession? Does the current situation justify gloom or conservative optimism? Are distributors' demands for lower prices unwarranted, or are they justifiable? Can processors meet these demands, or should they be resisted? These questions must be faced and answered before a semblance of peace of mind can be restored. Nevertheless, putting one's own house in order is not enough: the other fellow must do it too. Quality goods—even well known brands—in weak hands or in unbalanced distributor's inventories can be a problem.

Among the smarter business economists there is agreement that prices to consumers must come down. They conclude that unless prices at retail are reduced below resistance levels by voluntary action, they will ultimately be forced down in a disorderly manner by distress sales.

Farm prices of raw materials are too high for comfort. Wages are high. Plenty of buying power there. Yet distributors insist they are paying too much for resale merchandise. And processors of fabricated foods (baked goods, confectionery and the like) are in a similar position.

A preliminary report from the Department of Commerce shows that the latter half of 1946 the cost of food and beverages at retail was about 35 percent of consumer income. (The historic average is around 30 percent.) The 70 percent remaining after buying food is not enough to support the national economy. Since the structure of production in the United States has been built up on the 30 percent ratio, any marked and prolonged deviation above it is certain to divert too much buying power away from the non-food industries to sustain the economy as a whole. Hence consumer resistance to food prices is an important symptom.

An orderly price retreat is needed. The goal is not prewar prices, but prewar ratios. The objective should be restoration of the historic normal ratio of food costs to total consumer income. Organized labor believing our economy can be saved only by higher wages, will not retreat from present wage scales. Individual foods may deviate widely from the average, but for every high price there must be compensating lower prices.

Big question is how. There is no glib answer. Farmers must share the retreat. That may take legislation. Profit margins may be narrowed. Processes can gradually be made more efficient. Hidden wastes can be eliminated and waste materials converted to higher values than tankage or fertilizer. Above all, production schedules can be arranged to avoid creation of distressing surpluses that would interfere with a retreat. But we must keep in mind that food takes too much of the consumer's buying power for the national welfare.

H. V. Burton EDITOR

The Talk of the Industry

• IT is possible that America may become a nation of normal weight persons if the recent experiments of Dr. A. C. Ivy of the University of Illinois are capable of translation from dogs to human beings. Proceeding on the theory that appetite for alcohol and food is a brain function, he injected dogs with various substances that might exert a controlling effect. Benzedrine was found to eliminate appetite for food, and one dog was injected daily for 28 days during which it refused food. When the injections were stopped, it resumed eating after a loss of 25 percent of its body weight.

Whether the potentialities of the discovery will be good or bad for the economics of the food industry is something to be determined in the future. At the moment the opposing view-points just about balance. One point of view has it that the widespread use of such a regulator of appetite for food would reduce per capita consumption to amounts that could easily affect the total market. The opposite view holds that people who are overweight are usually folks who love food for its own sake, and that, if there were a safe and easy way to restrain one's appetite on occasion, they would feel free to indulge in gustatory delights whenever the opportunity presented.

Anyone with a more than passing knowledge of humanity and its intellectual processes is inclined to side with the latter view. But it should be borne in mind that the experiments were with small animals and, as far as is reported, there have been no corresponding tests on humans. It might well be that the treatment would turn out as harmful rather than good for humans. Whichever the outcome, however, the market for rich and fattening foods is unlikely to be adversely affected by it.

• STRIKES in U. S. in 1946 lost 116,000,000 man-days of production, not including shut-downs caused by shortages. This was three times the previous record in 1945 of 38,000,000 man-days lost.

Time lost in 1946 was 386,666 man-years and is equivalent to 198 men working 300 days a year from the year 1 to the end of 1946.

Wages lost by strikes alone were between one-half and one billion dollars.

• WHEN griping about the scarcity of sugar keep in mind that the 10-lb. per person increase over the 1946 allowance will need just 700,000 tons of sugar to make it good. Before the war the Philippines used to ship us more than that amount. Now they don't send us any.

• AT last the lowly corn cob has been put to a good use, chemurgically speaking.

Dupont research has discovered a way to convert corn cobs successively into furfural, then into adiponitrile, then nylon, then stockings. One bushel of corn cobs is equivalent to about 40 pairs of woman's stockings.

• YOU think you have troubles? A chap in the drop forging field just told us he was short of steels, and fuels, including coal, natural gas, fuel oil and propane. And then John L. Lewis decided on a memorial holiday!

• A BLIND AD in a local newspaper tells a story that many have predicted would come. Though not identified as such, the listed equipment indicates that someone in the precooked frozen food business has had enough. Too bad that it takes more than equipment and cash to make it go!

Hors d'Oeuvres

• In the new edition of his book on wine making, W. V. Cruess says, "Even during the Prohibition period in the United States, families of Mediterranean origin bought grapes and made enough wine for their own needs for the year." In a land of free speech, the professor has every right to state it that way if he wants to.

• *"Hens don't lay stale eggs, and they don't lay dirty ones," says a booklet published by the Institute of American Poultry Industries. Anyone want to argue?*

• The food and chemical industries are discussing robot operated plants, according to Pathfinder. One man supplies all the judgment needed to keep 1,000 machines at work. No heat, no light, no temperament. They also fear no customers for the output, which just shows how hard it is to please everyone.

• *It's good news for your budget, says the American Magazine: Orange crop a fifth more than last year, grapefruit up 6 percent. Whose budget?*

• In 1933, experts predicted that beer consumption would reach an annual total of 40,000,000 barrels. In 1946, almost 80,000,000 barrels were sold. Well, it reached 40,000,000 didn't it?

• *The frozen food packers at the San Francisco convention were told to cater to Elmer, the typical American. "He has no chin, no overcoat and no money." Wonder what happened to his chin.*

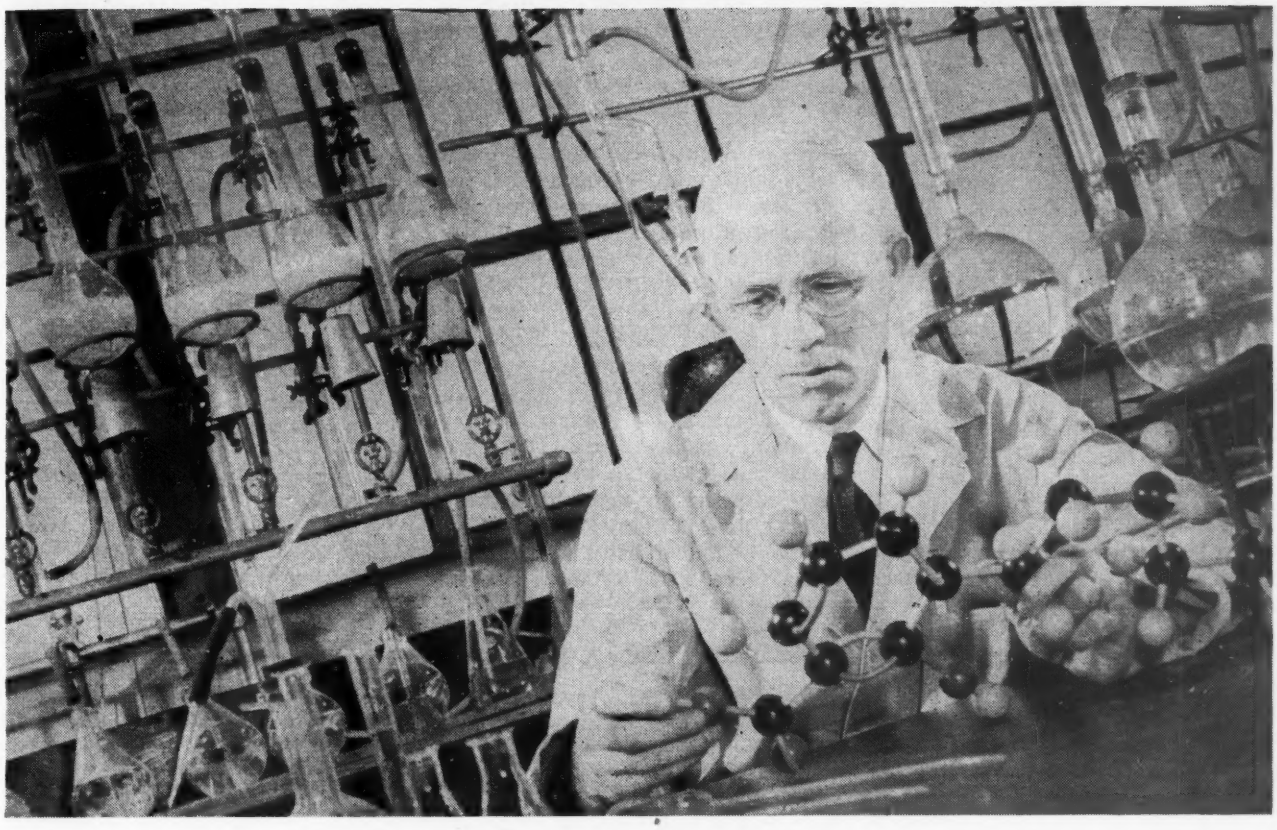
• USDA replaces OPA in rationing $C_{12}H_{22}O_{11}$. O. K.

• *The increase from 60 to 75 percent of 1941 use for industrial sugar users should help that new bakers' advertising campaign. That is, if flour doesn't again start playing hide-and-go-seek.*

• Maybe nothing should have been said about a predigested cud in the March column. A lab in Virginia manufactures an enzyme from molds that is said to do things to carbohydrate feeds. And a reader in Maryland reports that in some sections, when a cow loses her cud, it is the practice to feed her a salt herring. He doesn't say whether this is to console or punish her.

• *The interim Committee or Livestock and Dairies, of the California Legislature recently reported milk in good supply, butter and cheese short but nothing the committee could do about it, meat situation improved though pork will be short for some time. Consequently, the committee held no meetings and returned a $1,500 appropriation to the General Fund. Gentlemen, there is a law against undermining the Federal Government.*

J.A.J.J.



The author assembles a structural model of an organic formula.

How the Organic Chemist Can Best Serve the Food Field

Synthetic organic chemistry, well established in dyestuffs and medicinals, is becoming of increasing importance in food products research. Imitation maple flavoring and a new antioxidant are two valuable synthetic products

By R. E. KREMERS, Assistant Manager, Central Laboratories
General Foods Corporation, Hoboken, N. J.

ALTHOUGH the organic chemist in the food industry has been concerned in the past primarily with analytical work, he can today serve his employer best by balancing the analytical viewpoint with a synthetic and structural viewpoint. This may seem strange to the reader who thinks of synthetic organic chemistry only in terms of dyestuffs, plastics, or medicinals. Nonetheless, interpretations of the behavior of natural materials derived from analytical data can often be verified most advantageously by experiments which start with simple, known compounds.

An illustration which reveals the value of this analytic-synthetic approach may be taken from the writer's experience with coffee chemistry. After a decade of investigation which had been devoted predominantly to coffee analyses, it became evident that certain inferences should be checked by some independent method. These inferences pertained to reactions which were thought to occur between the protein-like substances and the carbohydrates in coffee. Since it is not possible to control these reactions independently of other reactions within the bean, a systematic study was undertaken of what occurred when these two classes of com-

pounds were reacted in the test tube. Moreover, by studying the reactions of individual amino acids with individual sugars, it was possible to observe specific results for specific combinations as well as to establish generalities. In a sense each synthetic reaction in the test tube became a particular model of what might occur in the complex aggregate which constitutes the natural coffee bean. The result of the synthetic work was the discovery of a way of making a superior imitation maple flavor.[1] But this was not what had been inferred from the analytical data. Thus the material result was at variance with the theoretical prediction and necessitated a new approach to the problem.

Controlling Rancidity

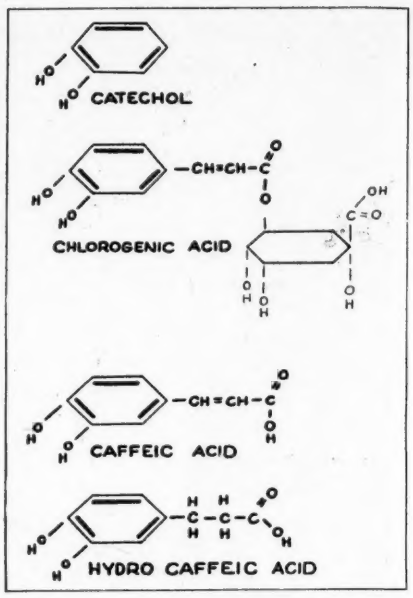
Another way in which structural concepts and a synthetic approach have been useful may be illustrated by a problem in the field of rancidity. The ready-to-eat cereals present special problems because the preservation of an acceptable texture demands the maintenance of low moisture levels, whereas rancidity is promoted thereby. Studies of the effect of antioxidants in wheat oil and in the cereals revealed quite a list of compounds that were effective in the oil, but not in the cereal. Some of these effective antioxidants were akin to constituents of the wheat which were thought to function as natural antioxidants. Moreover, it is well established that the wheat berry and wheat flour do not develop rancidity quickly at moisture levels of ten percent or higher.

The known facts were rationalized by assuming that some structure within the seed or flour, e.g., a colloidal system composed of oil, protein and water-soluble substances, was an important element in determining whether rancidity would develop. It was postulated that as the moisture level was lowered, some predominantly water-soluble material changed its location in the structure in such a way as to lose effective contact with the wheat oil, or vice versa. This structural concept of the problem led to the idea that an antioxidant which was predominantly fat-soluble would be more effective in ready-to-eat cereals than those naturally present.

Evolution of the Compound

Here again the synthetic approach was brought into play. Ways of making organic compounds more soluble in fats were known, but a further consideration was to select an appropriate starting material. Caffeic acid was our final choice because it appeared to combine those characteristics which were essential for success. These characteristics were:

1. It contained the catechol nucleus, which is known to be the prototype of a number of potent antioxidants.
2. It could participate in chemical reactions without involving the catechol nucleus.
3. In the form of chlorogenic acid, caffeic acid is a significant constituent of coffee and therefore it presumably would be acceptable when added to other foods.



Formulae show the evolution of a new synthetic product. Chlorogenic acid occurs naturally in coffee. It contains the catechol nucleus, basic structural unit of potent antioxidants. Having studied the structure of chlorogenic acid, chemists decided the related product, caffeic acid, should prove useful. Successful outcome is the use of synthetic caffeic acid ethyl ester as a stabilizing agent for frozen grapefruit sections.

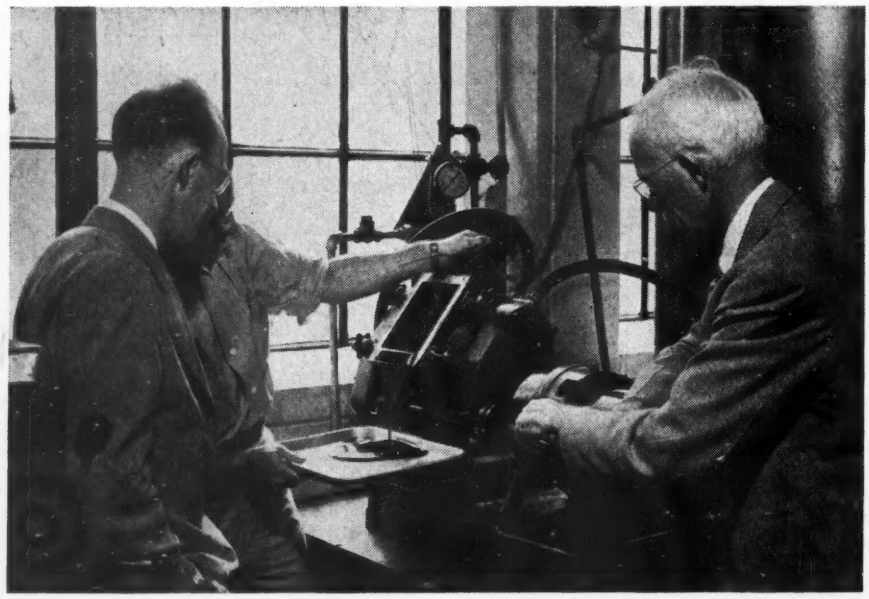
Starting with caffeic acid, esters were prepared of aliphatic alcohols ranging from ethyl up to lauryl alcohol. On testing this series of synthetic esters in various ways, it was found that they were fat-soluble, that their molar antioxidant potency was equal to that of the original caffeic acid, and that they gave certain food products a greater protection than their predominantly water-soluble analogs, such as catechol and chlorogenic acid. Although other means have since been found for protecting the fatty oil in certain cereal products, e.g., the Army's Pre-mixed Cereal, one of the newly created antioxidants, ethyl caffeate, is used to stabilize frozen grapefruit sections. It might be mentioned too that it was feasible to obtain the caffeic acid from green coffee in the earlier stages of the development, but that synthetic caffeic acid has replaced the natural.

Unexpected Result

A further extension of the synthetic approach to food problems resulted in the discovery that hydrocaffeic acid is an exceptionally potent antioxidant. It was known that some aliphatic acids, such as

(*Continued on page* 216)

[1]Patent pending.



Concentrated, imitation maple flavoring flows out of the steam jacketed unit used for the fusion operation, an important step in the process of synthesis.

The Outlook in Packaging

Label design, selection of shipping containers, standardization, machine development were discussed at the 16th Packaging Conference and Exposition in Philadelphia. Scarcities and high prices are delaying improvements

Food Industries Staff Report

NEW packaging developments were notably few at the 16th Packaging Conference and Exposition of the American Management Association, in Philadelphia, last month. Scarce materials and the high prices prevailing for the materials and equipment that are available were generally blamed for this failure to show marked advances.

By far the greater portion of the exhibits was centered on food packaging. This emphasis was reflected in turn by the attitude of the food processors, who manifested increasing interest in the sales, economy and efficiency of the food package.

The discussions centered around the formulation of sound packaging programs that would be readily acceptable to management. The talks ranged from proper design for labels to selection and use of shipping containers, with economy of operation getting closer attention than ever.

In outlining the points to be considered in a label, W. J. Sanning, director of advertising for the Kroger Co., showed that it must be integrated with management's thinking and must fit sales and merchandising policies. Both package and label designs must have the confidence and support of every salesman, dealer and store clerk.

Packaging Program

Setting up a packaging program to reduce material and labor costs should start with standardization, according to J. A. Warren, packaging consultant, American Home Products Corp. He mentioned specifically the cost-saving results of standardization in the sizes of jars. With the use of a bag and carton, Mr. Warren said, about 450 packages were produced per man hour. When a fiber container was substituted, production per man hour was doubled. In this case, labor savings more than offset the added cost of the fiber container. Rigid specifications for cartons must be maintained if they are to be used efficiently on high speed, automatic cartoning machines. He cited two instances where improved specifications raised production from 90 to 140 cartons per minute.

Produce consumer packaging at the source was designated as the growers' only hope in meeting processed foods competition, by A. L. Martin, director of research, Western Growers Association. The cost of packaging these foods at wholesale and retail levels is too great due to the high percentage of waste. Only 60 percent of the weight of each carload, he said, can be packaged by the time the shipment reaches the distributor.

Machine Field Limited

There is little prospect for greatly improved food packaging machinery, in the opinion of Moorhead Patterson, American Machine & Foundry Co. He pointed out that in a field that is always limited, the machine manufacturer is today competing against machines already installed. Formerly the competition was hand packaging. In addition, cost of materials has gone up 50 percent, labor has risen 75 percent, while the efficiency of labor has gone down. Thus the only way to finance the cost of new designs and new production is for the food packer, or material supplier, to enter the picture.

The material supplier can help finance new machines in return for exclusive use for a specified period, usually about three years. Food packers could also assist by grouping together to help these machine builders finance new operations.

Rule 41, the railroad regulation governing construction and use of fiberboard shipping containers came in for a full length discussion. As a result of an increase in damage claims from $41,000,000,000 in 1940 to $79,000,000,000 in 1945, the railroads are urging changes in the regulation. It was suggested that the railroads set up uniform claim procedures that would insure full information on all claims reaching the shipper.

The only effective way to load miscellaneous freight is to segregate the different types and brace each group by a bulkhead as though it comprised an entire carload, in the opinion of A. P. Kivlin, New York, New Haven & Hartford RR. Co. He added that it is sometimes possible to obtain similar results by loading each type of freight in lengthwise rows, being careful that the weight is evenly distributed over the floor area of the car. In this case the bulkhead is used in the doorway to brace the entire load.

The "visual" laboratory developed at Joseph E. Seagram & Son, Inc. was described by N. F. Giradot. This laboratory tests the human reaction properties of packages and related materials, demonstrating, among other intangibles, the attractiveness of the container from the consumer's standpoint, the legibility of the label, the attention value of the package, and the extent to which the package is remembered after varying time intervals.

Other types of studies conducted in this visual laboratory, Mr. Giradot said, include an evaluation of the operations required to open and handle a package. This involves the actual handling of packages and the rating of several proposed shapes and closures. The latter is important, he added, since a package is generally opened and resealed a number of times before it is empty.

Work Simplification Cuts Cost Of Skinning Frankfurters

By assigning work not requiring skinner's skill to others, and by the development of a vacuum system for removing casings from the hands of skinners, production was increased 41 percent, cost reduced 29 per cent

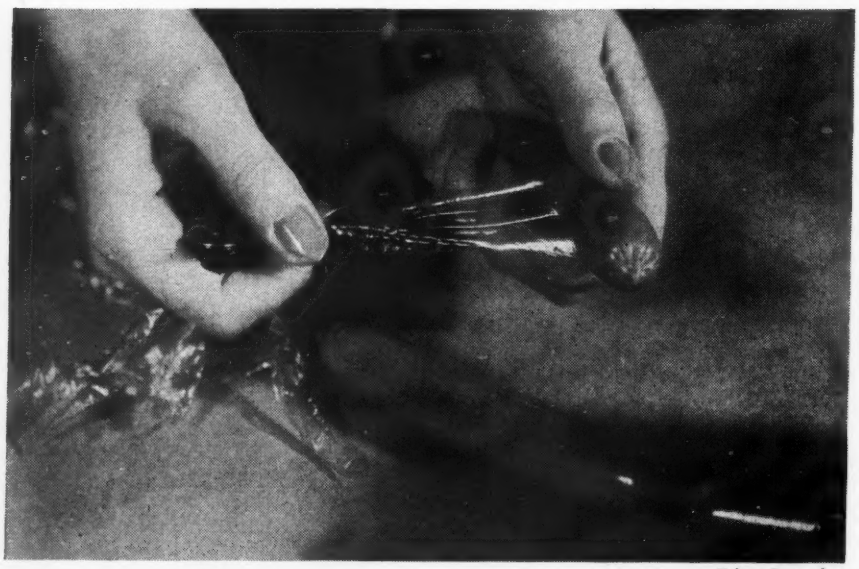
By V. C. STEPHENS, JR., Supervising Engineer
Singleton-Hartwell, Inc., Management Engineers, New York City

USE of a vacuum method of removing artificial casings adhering to the skinner's hands during frankfurter skinning has helped to increase production. In addition, by passing those activities not requiring skinner's skill along to less skilled personnel, production has been further increased. An estimated 41 percent increase in production or a 29 percent saving in skinning cost was accomplished by these changes, in one packer's plant.

Conventional Method

In the conventional frankfurter skinning and packaging operations, frankfurters are first disentangled and casings are stripped off the frankfurters with a knife. When two to four frankfurters are skinned, casings are deposited into a receptacle located adjacent to the skinner. Because of the greasy condition of the frankfurters, casings adhere to the skinner's fingers, are difficult to remove, and slow down production. After one or two frankfurters are skinned, the skinner packs them into cartons to approximately the required weight. Skinners also set up their own cartons.

A conveyor then carries the cartons to a scaler who adjusts the number of frankfurters to obtain the correct weight by placing a sufficient number of banded frankfurters on the top layer. Paper-banded frankfurters carry the packer's brand and establishment number. Bands are about one inch wide and are sealed to the frankfurters by a band-sealing machine. One girl is employed to band frankfurters for each skinner.



Viking Corp. photo

Stripping artificial casings from frankfurters is a hand operation requiring skilled personnel. Since casings are greasy, they adhere to the hands and slow down production.

Inefficient Practices

The following inefficient practices were found through time studies and methods analysis:

1. Disposing casings into a waste barrel resulted in a production loss of one frankfurter for every three skinned.
2. Casings littered the floor and added to the clean-up work.
3. Packing frankfurters in cartons by the skinner resulted in a production loss of one frankfurter for every four skinned.
4. Skinning production, equivalent to one frankfurter for every 24 skinned, was lost through folding and preparing cartons.
5. Weighing and adjusting the weights of each packed carton took almost as much time as completely packing a carton.
6. All banded frankfurters were packed in the top layer of the carton. Consequently, the product lost its identity after the top layer was sold.
7. Extra handling, due to banding, resulted in some loss of time. More important, banded frankfurters were in poorer condition.

Experimental Vacuum System

An experimental work table with an opening below the right hand of the skinner was first constructed. The opening is connected to the body of a household vacuum cleaner by means of a standard hose attachment.

A skinner of average skill was

used to test this system and utilize the drop delivery. The vacuum removed casings from the hand of the skinner as fast as they were stripped from the frankfurters. An 89 percent increase in output, equivalent to a 47 percent saving, was accomplished. The value of the system was established in this way before spending money on expensive equipment installation.

Improved Method

By passing those activities not requiring the skill of a skinner, such as folding and setting up cartons and packing frankfurters, along to less highly skilled employees, production was increased. This was accomplished by:

1. Providing a "drop delivery" on the work table so that skinned frankfurters, dropped on an inclined portion of the table, would roll directly on to a belt conveyor. At the end of the conveyor the frankfurters fell into a catch bin from which they were packed into cartons and weighed by a packer-scaler.

2. Setting up and folding cartons by a service employee.

3. Removing casings mechanically from the skinner's hands during skinning, and avoiding littering the floor with casings.

Skinless frankfurter packing benches were then built for 30 skinners. Each bench was provided with a level section on which one or two smoke sticks of frankfurters could be placed. By limiting this space, sticks of frankfurters were kept orderly and tangling of frankfurters was avoided.

Casings were removed in the conventional manner. The improved method differed from the conventional method in the following respects: (1) Tangling of strings of frankfurters was avoided, (2) casings adhering to the skinners' hands were quickly removed by vacuum, and (3) skinners were not required to set up cartons and pack frankfurters into them. Six of the thirty skinners banded frankfurters as they skinned them, thus providing the proper proportion of banded frankfurters intermingled with the others on the belt. Banded frankfurters were then distributed at random throughout the box instead of all being on the top layer.

Casings were sucked into a 1-in. x 6-in. opening in the bench through ducts to a bin located in the basement of the building, directly adjacent to the incinerator. Suction was provided by a 42-in. centrifugal blower operating at 900 rpm. and driven by a 10 hp. motor.

The bin was equipped with baffles acting as a wind-break which caused the casings to drop. Loss of cold air was prevented by passing the air back to the sausage cooler and into the refrigerating diffuser system. To avoid back pressure, a smaller centrifugal fan, operated by a 5 hp. motor, was used as a booster on the return duct.

After casings have been stripped by skinners and folding boxes set up by a service employee, the frankfurters are packed in cartons and weighed by a packer-scaler.

Difficulties to Avoid

Before installing a vacuum system for removing loose casings from the hands of skinners, the following precautions are advisable:

1. Avoid blind traps, sharp bends or any other duct work that might cause eddies in the air currents. Eddies created in the air current deposit casings in traps where they build up into a large ball, dry up, and increase in size until either the duct is plugged or the ball of casings passes through the duct and lodges in the fan wheel blades. Instead of traps, provide removable sections in the duct so that the system can be cleaned periodically.

2. Obtain recommended air velocity and static pressure under which the system should operate from a blower manufacturer's engineer. With proper air velocity, casings will float through the ducts without balling up or sticking to the side walls.

3. Secure a manufacturer's recommendation on the proper fan wheel to use and the speed at which it should operate. If an improper fan wheel is used, casings may become entangled in it and thereby spoil the efficiency of the blower by reducing the air velocity and jamming up the duct system with casings.

Time studies were made on the new and old methods. With a total

(*Continued on page* 234)

TABLE I—Time Studies of Old vs. New Method of Skinning Frankfurters.

Old Method

Operations	No. employees	Production per man-hr., lb.	Total production, lb.
Skin and pack	26.5	100	2,650
Scale	2.0	1,445	2,650
Skin and band	5.0	48	240
Total	33.5	....	2,890*
Production per man-hr.			87

New Method

Operations	No. employees	Production per man-hr., lb.	Total production, lb.
Skin	24	170	4,080
Pack and scale	6	680	4,080
Skin and band	6	71	426
Set-up cartons	1	4,080	4,080
Total	37	....	4,506*
Production per man-hr.			122
Production increase per man-hr.			41%
Savings per man-hr.			29%

*Total hourly production.

New Device for Grading Pectins

A simple apparatus, the rigidometer, has been developed for determining jelly grades of commercial pectins. It measures the modulus of rigidity of gels. The method is rapid, precise and easily adapted to control work

By HARRY S. OWENS, OPAL PORTER and W. DAYTON MACLAY
Western Regional Research Laboratory*, Albany, Calif.

A NUMBER of instruments for measuring one or another of the properties of pectin gels have been developed to determine the jelly grade** of pectin, but none of them has been accepted as standard in this country. Perhaps the reason for this lies in the fact that the practice has been to use pectins of assumed grade for standardization purposes rather than to accept a particular type of gel as standard and to grade all pectins to that standard. This paper describes various gel testers and gives the advantages of an instrument that will measure the modulus of rigidity of gels.

*Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

**Jelly grade may be defined as the weight of sugar with which one part by weight of pectin will, under suitable conditions, form a satisfactory jelly containing 65 percent total solids.

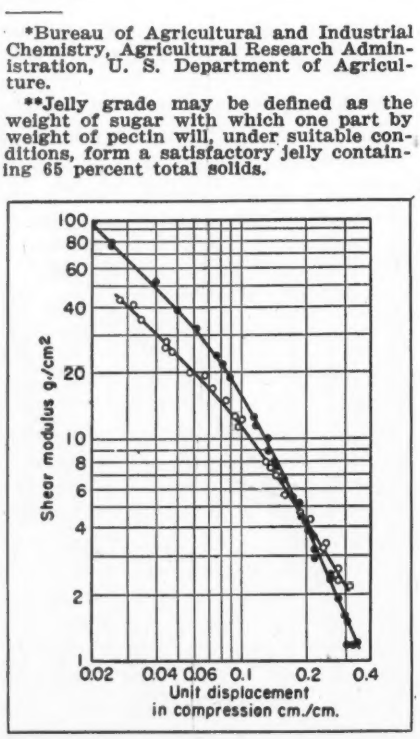


Fig. 1. Shear modulus plotted against displacements measured on sagometer. Open circles represent low-solids, low-methoxyl pectin gels; closed circles high-solids, high-methoxyl pectin gels.

The physical requirements for a pectin gel do not vary greatly, whether it contains a high or a low percentage of solids. In addition to possessing a pleasing appearance and taste, a pectin gel should be sufficiently rigid to maintain its form, and it must be easily cut and spread.

The ability of a gel to maintain its form is a function of its moduli of elasticity*** namely in (1) Tension, (2) compression, and (3) shear. Methods for measuring these will be discussed.

Modulus in Tension or Compression

Because of the poor adhesive qualities of pectin and because of the brittleness of its gels, most mechanical methods for the determination of Young's modulus are not adaptable. We have measured the bending angles required to cause them to fracture. While differences between low-solids and high-solids gels are marked, the method is not yet satisfactory for distinguishing gels prepared with slowly and with rapidly setting pectins.

The modulus in compression and that in tension are usually the same. The former can be measured by the sagometer of Cox and Higby[1], provided the unit displacement is less than six percent.[7] Fig. 1 shows the plot of the shear modulus**** against unit displacement values. The curve for high-solids gels follows the theoretical curve[7]. Results with low-solids gels lie below the theoretical curve, although close to a line obtained when allowance is made for a slight change in volume. In the range of values of the modulus which has practical significance (2 to 4 g./cm²) the curves have high slopes which vary with different types of gels. This necessitates different calibration curves, a requirement unnecessary with torsion-type testers.

***Modulus of elasticity is the ratio of stress to strain where stress is the force per unit area, and strain is the ratio of change in dimension to that of the original.

****Shear modulus was measured by the technic to be described, and is equal to one-third the compression modulus if no change in volume results from the strains set up in the gel.

Modulus of Rigidity

The measurement of the modulus of rigidity is readily adapted to control work, and the procedure is simple and direct. Several instruments have been designed[2,3,4,5] for this purpose. In this laboratory a simple apparatus (rigidometer) has been developed which consists of a motor-driven torsion head, a torsion wire, a torsion blade to be imbedded in the gel, and a means of measuring the rotation of the blade. The form of the instrument used in this work is diagrammed in

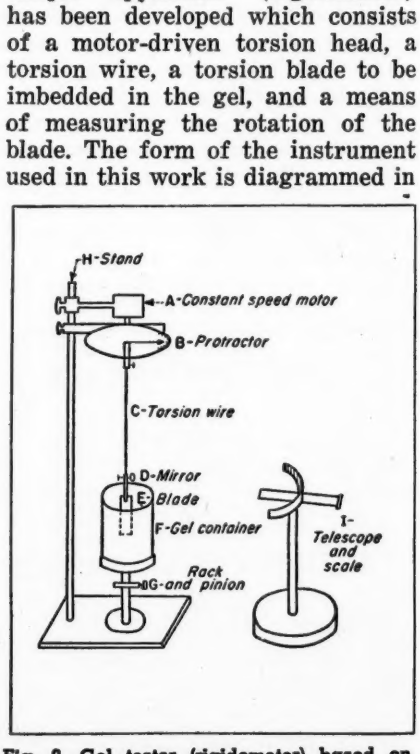


Fig. 2. Gel tester (rigidometer) based on torsion principle. Telescope and scale used to measure rotation of blade.

Fig. 2. The dimensions can be varied considerably. For example, Saverborn[5] used a wire 54.8 cm. long, 0.051 cm. in diameter, and a gel height of 3.3 cm.

The type of blade can also be varied. A 4-vaned blade gave results similar to those with the single blade when used with pectin gels. Rotation of the blade can be measured by means of a telescope and scale, Fig. 2, by means of light reflections on a scale (the method shown in Fig. 3), or by means of a protractor. While the torsion head may be operated manually, more consistent results are obtained by use of a constant-speed motor, such as a Telechron motor, geared to about 0.05 rpm. The instrument can be adapted to consistency measurements of other food products and for viscometric measurements of highly viscous liquids.

To obtain absolute values the blade must be calibrated against a cylinder. A stainless steel cylinder 1.25 cm. in diameter with 20 serations 0.02 cm. deep and 0.02 cm. wide is attached to the wire in place of the blade. It is suspended in a layer of mercury in a 400-ml. beaker to reduce end effects. The errors due to the serrations of the cylinder and irregularities in the beaker are less than the errors involved in preparing gels. The gel is cast around the steel cylinder and covered with paraffin oil to reduce evaporation.

After the gel has been allowed to stand for 18 to 24 hours, the angle of twist given the cylinder by a 10 degree twist of the wire is measured. A similar measurement is then made with the blade attached to the wire and inserted in a separate portion of the same gel. To calculate the results, wires of known torsional moments, such as those supplied with the MacMichael viscometer, are required. A piano wire 20 cm. long and 0.047 cm. in diameter with a torsional moment of 17 g. cm. was used in this work. The value for the moment is substituted in the equation

$$E_s = \frac{k}{4\pi h}(1/r_i^2 - 1/r_c^2)\frac{\delta}{w}$$

where E_s is the shear modulus in g./cm.^{2}, h is the length of the gel in cm., r_i and r_o the radii in cm. of the inner and outer cylinders, respectively (the ratio of r_i to r_o should not be greater than one to three), δ is the angle of displacement of the torsion head (the angle through which it turns minus the angle (w) through which the inner cylinder turns), and k is the torsional moment in g. cm. The moment is readily determined if a rod, suspended from the wire, carries two similar weights at known distances from the center. Fig. 4 illustrates the apparatus employed. The brass cylinders weighed 102.2 g. each. The time of oscillation was determined with the weights at different distances from the wire. A plot of the square of the times (t) in sec. against the square of the distance (d) in cm. gave a straight-line plot, the slope of which (t^2/d^2) was substituted in the equation

$$k = 8\pi^2 M/Sg$$

where M is the mass in grams of one cylinder, S is the slope, and g is acceleration of gravity.

Value for shear modulus against the angle of twist of a 1x5-cm. blade are plotted in Fig. 5. When the blade is used, the gel is cast in a jelly glass with a tape sideboard. After the gel has been allowed to stand overnight, the sideboard is removed and the excess gel sliced off. The glass is placed on the rack and pinion platform, and raised until the blade is inserted five cm. into the gel. A reading on the scale is taken (as with the cylinder), the motor turned on, the torsion head turned 10 degrees, the motor turned off, and the new scale reading taken. The calibration curve obtained is the same for all types of gels, such as high-solids gels, low-solids gels, and gels at various pH values. Application of shear moduli to grading of pectin is discussed later.

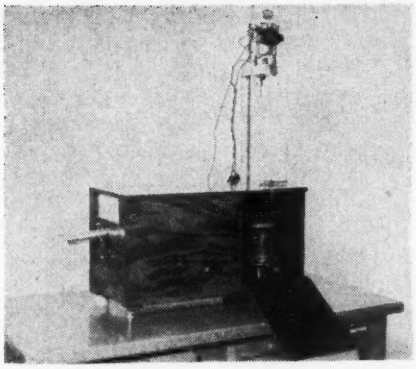


Fig. 3. Optical lever of rigidometer used to magnify degrees turn of blade.

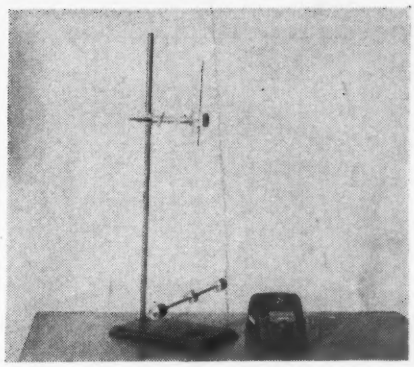


Fig. 4. Apparatus necessary to measure torsional moment of wire.

Breaking Strength

A measure of brittleness of gels may be obtained from breaking-strength measurements. For that reason the Tarr-Baker apparatus[6] was used on many of the gels. It was modified by placing a flowmeter in the air line so that a constant rate of loading of 20 cm. of carbon tetrachloride per minute was applied. For high-solids gels the breaking strength is a linear function of the elastic modulus as shown in Fig. 6. The slope of the line, however, varies with the molecular weight of the pectin[7]. With low-solids gels prepared with pectinic acids containing about three to four percent methoxyl, the breaking strength showed deviations which appear to depend upon the calcium-to-pectin ratio. A disadvantage of the breaking-strength test is its poor precision, varying from five to ten percent, as compared to two to five percent with the rigidometer or sagometer[7].

Penetrometers were not examined in this study. In another study, however, G. Johnson and M. Boggs of this laboratory found a linear relationship between the sagometer and a penetrometer when they examined high-solids gels. Pre-

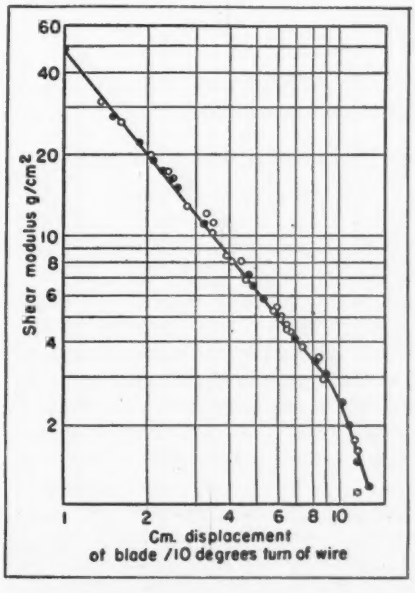


Fig. 5. Calibration of blade used with rigidometer. Cm. displacement refers to the reading on the scale. To convert to degrees, divide by 1.7.

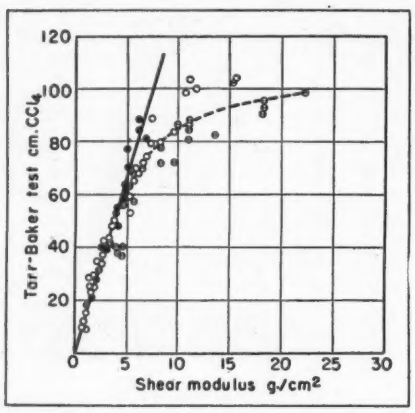


Fig. 6. Breaking strength as a function of shear modulus. Open circles, low-solids, low-methoxyl pectin gels, calcium to pectin ratio <30 mg./g.; circles with line same as before except calcium to pectin ratio >30 mg./g.; closed circles high-methoxyl, high-solids gels.

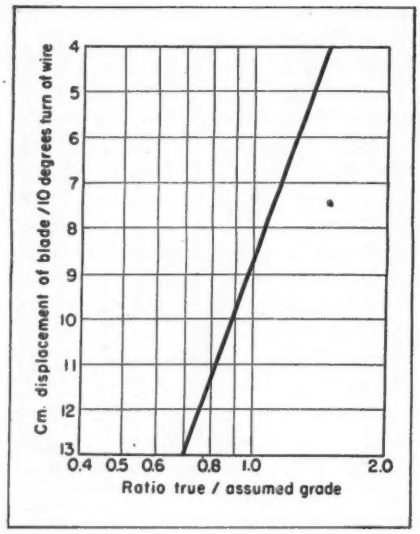


Fig. 7. Plot of log of ratio of assumed jelly grade to assumed grade of pectin against degrees turn of blade. Divide values on abscissa by 1.7 to obtain degrees.

sumably conclusions based on the one could be applied to the other.

Evaluation of Pectin Gels

When using the described instruments for grading pectin, either a standard pectin must be chosen and the instruments calibrated against it, or an arbitrary standard for gel rigidity or gel strength must be chosen and all pectins standardized to that value. With rigidometers and their theoretical relationship to shear modulus, the better choice is to set an arbitrary standard. A value of 3 g./cm² was selected, because gels of that rigidity have a satisfactory firmness when supported only at the bottom. The value falls within the range used by the English workers[8], and it is close to the one found for the gel chosen by Cox and Higby as standard for the sagometer which was calibrated against pectins of assumed grade. In practice it is preferable to prepare gels stronger than standard, because measurements of shear modulus are more reproducible and the values fall on the linear portion of the calibration curve shown in Fig. 5. The standard for the Tarr-Baker tester is 40 cm. of carbon tetrachloride as recommended by the manufacturers.

Preparation of Pectin Gels

Many methods have been proposed for preparing gels for grading pectin. We have arbitrarily chosen modifications of two of them for comparative purposes. One is similar to that recommended by Cox and Higby, which requires boiling the jelly mixture, then pouring it into jelly glasses containing two ml. of jelly makers' acid (citric acid solution in our experiments). The boiling times used are the same as those given below. The final pH is usually between 2.2 and 2.5, depending upon the degree of neutralization of the pectin. The second method is similar to the one recommended by Olsen *et al.*[9]

The salt solution used had the following composition: 1.62 g./l. potassium citrate monohydrate, 2.6 g./l. potassium dihydrogen phosphate, 2.03 g./l. of magnesium chloride hexahydrate, and 1.10 g./l. of anhydrous calcium chloride. The concentrations of the cations represent an average for several berries, apples, peaches, grapes, and cherries. The pH is adjusted to 3.0 with citric acid, which represents a value suitable for jellification of berry and apple juices.

The procedure is to place in 250 ml. of the salt solution a weighed amount of pectin mixed in 78 g. of sucrose minus the weight of the pectin. After the pectin is dispersed, the pH is adjusted to 2.9. The addition of sucrose increases the pH to the final value of 3. The solution is transferred to a weighed jelly pan, and 50 ml. of water is used for washing.

The solution is brought to a boil with stirring on a gas plate to which is attached a flowmeter so that a constant rate of heating is obtained. After the solution has boiled one minute, 400 g. of sucrose is added in a one-minute interval, and the mixture is boiled another minute, or a total of three minutes at the boiling temperature. The final weight of the jelly mixture is adjusted to 740 g. If the specified amounts of materials have been added, little or no adjustment should be necessary. The solution is poured immediately into jelly glasses with sideboards, and allowed to stand 18 to 24 hours. The jelly can be tested with the three instruments described, provided the last one used is the Tarr-Baker tester.

The amount of pectin weighed should exceed that required for a standard jelly, because the results are more reproducible with stronger gels. In other words, the assumed grade should be equal to or less than the true grade as finally determined. A shear modulus of 3 g./cm.² and higher will yield satisfactory points, while one much below two is likely to lead to considerable error on extrapolation.

If the log of the ratio of true grade to assumed grade is plotted against the degree of turn of the blade per 10 degree turn of the torsion head, a straight line is obtained, as shown in Fig. 7. Once the measurement has been made, one can refer to the plot as has been done by Cox and Higby with the sagometer, and Mottern and Karr[10] for the Tarr-Baker tester. A scale giving the ratio of true and assumed grade can be placed on the gel tester so that it can be read directly. Comparison of jelly grades measured by the three instruments and two media are shown in Table 1.

Several interesting points are revealed by the table. With high methoxyl pectins, the ratio of grade between the acid medium and the synthetic fruit juice medium is about 1.2. If the methoxyl con-

(*Continued on page* 236)

TABLE I—Jelly Grades of Several Pectins as Measured by the Sagometer, Rigidometer, and Tarr-Baker Instruments.

Pectin No.	Source	MeO, per cent	pH 2.2-2.5 Sag.	pH 2.2-2.5 Rig.	pH 2.2-2.5 TB	pH 3.0 Sag.	pH 3.0 Rig.	pH 3.0 TB
A1	Apple (comm.)	10.9	250	250	300	220	220	250
A2	Apple (comm.)	9.0	230	230	230	220	220	230
1176	Apple (lab.)	...	120	125	130	90	90	70
1177	Apple (lab.)	...	90	90	100	70	70	...
1166	Apple (lab.)	...	125	130	...	105	105	...
L96	Citrus (comm.)	10.1	210	210	210	180	180	...
L143	Citrus (comm.)	10.4	280	280	400	230	230	260
L97	Citrus (comm.)	9.0	200	200	170	180	180	...
804	Citrus (lab.)	8.0	240	240	230	220	220	210
620	Citrus (lab.)	7.2	210	210	190	200	200	170
640	Citrus (lab.)	6.4	190	190	190	180	180	140

Plant of Maple Island Farm, Inc., New Richmond, Wis., operates on the one-story principle. The second floor next to street is used for storage of supplies. A 3-story tower gives headroom for two milk driers and provides for tiering of processing equipment.

What's Ahead in Milk Processing

PART III—No one set of specifications will apply to all future milk-processing plants. The one-story plant, in pleasant clean surroundings, with space for future expansion, offers the best opportunity for profitable operation

By M. E. PARKER, Counselor in Food Production Development, and
E. S. STATELER, Associate Editor, "Food Industries," Chicago

IN Part II (April, FOOD INDUSTRIES), we discussed some of the factors that have potential influence upon the types of diversification likely to take place in future dairy plant operations and products.

Since it must be apparent that a great variety of combinations are possible, only principles, rather than details, can be dealt with in a discussion of this nature. The factors which require study and consideration are so diverse that no standard detailed blue-print will apply. Even if such a blue-print were possible in theory, it would prove impractical because of such factors as building site, surrounding barriers to expansion, terrain and related real estate problems.

However, we are reasonably safe in predicting that the milk-processing plant of the future will be designed with an eye to efficiency of operations as the primary consideration. Operating on any other premise certainly will prove costly, if not ruinous. Such a plant probably will tend to resolve itself, wherever possible, into a one-story structure with headrooms of varying heights, dependent upon whether it is to be a powder plant, a condensery, a cheese factory, an ice cream plant, or a milk bottling plant, but sufficient in all cases to permit housing of equipment and tiering processing equipment or storage of supplies (including packaging containers) wherever necessary.

However, the small- to medium-sized company may well use two-story plants when all processing equipment can be confined to one floor and the milk and supplies storage, laboratory and office activities can be carried out on the second floor.

The ideal location for these post-war dairy plants will be where real estate values will permit a horizontal expansion. In those instances where a second story will prove advantageous, it will most likely be used for storing supplies, such as milk, packaging materials, and certain dry ingredients. However, the humidity conditions which develop in connection with most milk-processing operations make desirable the segregating of supplies and ingredients from processing conditions prior to their use.

Reiterating that no standard blue print will suffice to indicate an ideal dairy plant layout, and that only principles can be emphasized in a discussion of this character, we

make use of the diagrammatic sketch illustrated in Fig. 1 to point up the discussion. In this sketch we have shown a railroad siding as a barrier to future expansion. This barrier can readily apply to a country milk-processing plant, whereas in the case of a city processing-distributing plant it might be an alley, a street, or a similar barrier.

The principle we wish to establish is that the service area of the plant should be nearest the barrier to future expansion. In the service area would be located all fixed facilities such as power plant, toilets, washrooms, locker rooms, laboratory and offices. The dotted lines projecting into the receiving and finished products areas indicate tiering either above or below the operating floor, or both, whichever offers the most desirable solution. Incidentally, the service area would be preferably next to the processing and packaging area and projected above and below it by tiering so as to aid in the handling of materials and ingredients. Actually, in some types of plants, some tiering of processing operations might be found desirable. In a milk bottling plant, for example, advantage can be taken of gravity flow to fill containers with viscous products such as cultured and chocolate milks.

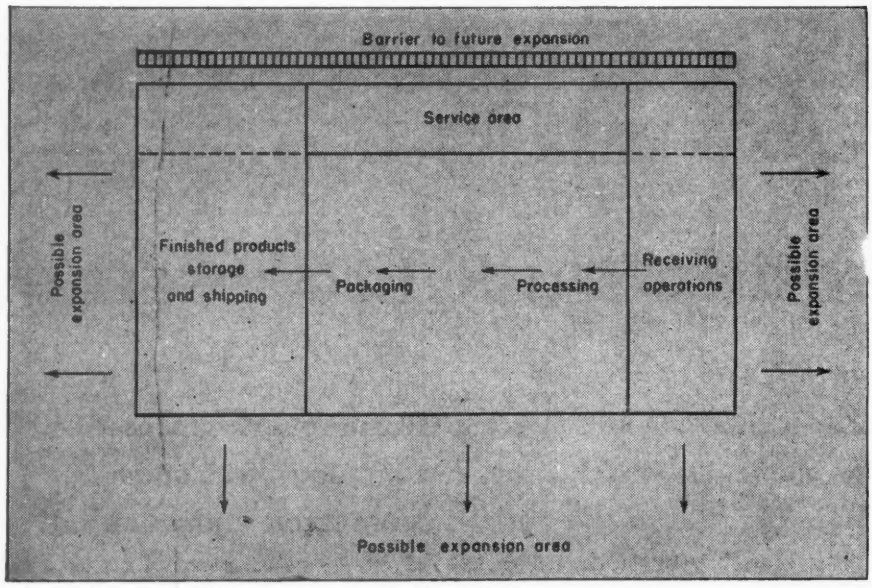


Fig. 1. One-story plants offer best opportunities for expansion if located where real estate is inexpensive. Revamping of entire plant to obtain increased processing facilities is avoided by putting service installations nearest to expansion barriers.

(Bowman Dairy Co. photo

Well-drained floor; high ceiling; tiered receiving, storage and heat-exchange equipment and straight-line assembly of other processing equipment characterize the one-story principle in modern dairy plant construction.

In all cases, the area will be apportioned in a ratio conforming with the products and operations involved. In the receiving operations area, the normal plant will be concerned with both the daily receipts of milk and the intermittent receipt of supplies. Those operations require separate receiving departments. Also, suitable storage tanks would be provided in the receiving operations area for collecting, holding and standardizing the fluid-milk products prior to their processing. Adjacent to such area would prove the logical location for the laboratory which, incidentally, should be readily accessible to both the receiving area and the processing-packaging area. Consequently, it will be preferably on the floor level of the processing area.

By adhering to the single-story structure, insofar as it is practicable, more available operating space will be provided in the beginning and will be permitted with a minimum of disruption of plant operations. This provision, of course, is important in a daily-operated manufacturing plant such as any dairy products plant must be. Furthermore, and what is more important, a single-story structure will lessen building disintegration, which is the bane of any food manufacturing company.

Docks and Conveyors

In the receiving and finished product areas, full advantage should be taken of docks and conveyors to permit ready handling of transport cans, cases and packages. All possible manual lifting should be avoided as it impairs efficiency and retards operations. Then, too, conveyors should be provided, as far as is practicable, to receive and distribute packaging materials, supplies and ingredients. Elevators retard and add to the incidental labor costs. A judicious allocation of such incidentals will prove valuable in considering the plant design and will contribute considerably to the maintenance of economic and efficient operations.

The orderly flow of materials made possible in a one-story structure will be found of considerable importance in planning the economy of equipment placement and, particularly, in providing ready access for cleaning and sanitary practices. The latter is becoming increasingly important, both with respect to the essential labor required and to the facility with which inspection can be applied. A maze of pipelines and congestion of

equipment are always discouraging to the workers responsible for the clean-up. Such a condition is also aggravating to the public health official whose peace of mind is such valuable goodwill to the management that it should not—in fact, cannot—be ignored.

Better Supervision

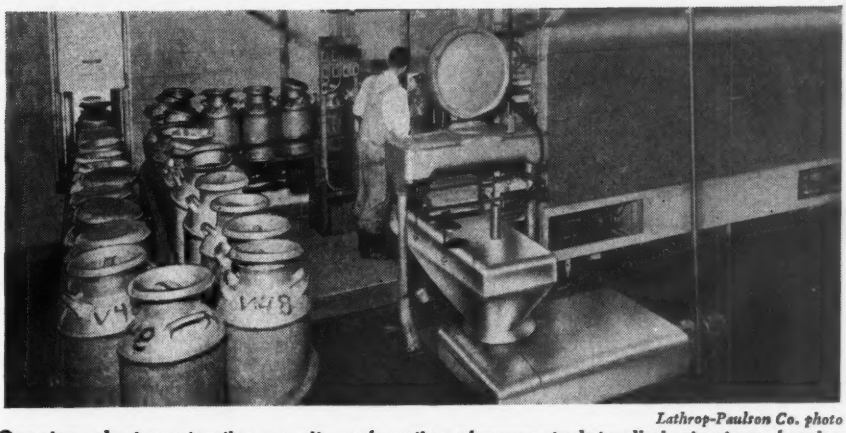
The principle of a one-story structure can be maintained as long as manufacturing operations are performed on the same horizontal plane. It is a principle worth fighting for. Supervision and effective labor conditions are better maintained when they are under constant surveillance. While provisions for segregation of some departments—and, incidentally, some operations, such as the cooling of milk —are required either for ethical, economical or public health reasons, the single story principle will be found much more advantageous than a multi-storied structure.

Single-storied construction will provide for better and more economical ventilation, an important consideration in dairy products plants where water and steam vapors can prove extremely troublesome. Also, better natural lighting is provided. Space is fluid. Where buildings are properly located on their sites, expansion can take place when and where required without disintegration of established plant services.

Plant Orderliness

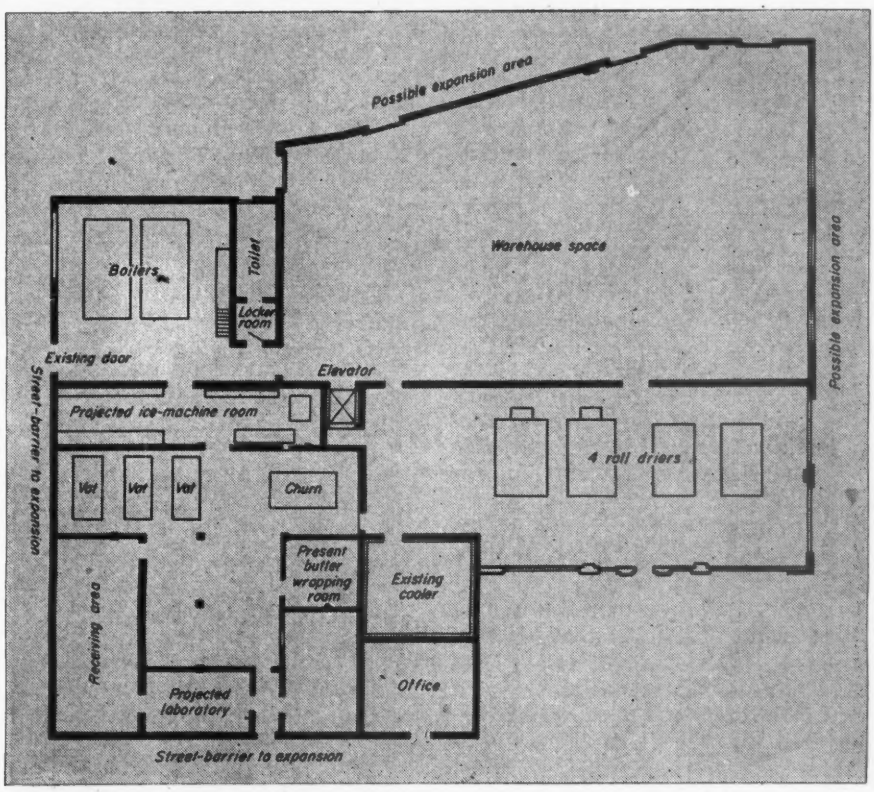
While the foregoing has been concerned with efficiency of operations and of the incidental labor, it is well to keep in mind also that adherence to the one-story principle can be projected into even broader advantages when real estate permits. Food factories are coming under increasing scrutiny of the public health officials as well as of the consuming public. Many dairy establishments are providing facilities for entertaining consumer groups. Therefore, not only is orderliness in plant operations and practices becoming increasingly important for the confidence it inspires in the consumer of milk products, but landscaping of the surrounding premises can be turned into very real and economical advertising. Orderliness and neatness also has its psychological effects upon plant operatives. Where open areas are provided in operating departments they make for ease and facility in production practice and sanitary cleanup and will stimulate pride in the employee. Then, too, discipline is better maintained and less horse-play prevails. When strenuous efforts are taken to provide ease, facility and efficiency in plant operations, they have the very desirable effect of instilling and maintaining employee enthusiasm for the job, especially when the boss takes visitors through the department and indulges in a little open bragging.

After all, a food factory is engaged in important and vital work. It must have an efficient layout and be orderly. It must be economical and effective in its operations. It must be pleasant in its surroundings and located intelligently with respect to supply of raw materials and markets to be supplied. Foremost of all it must be planned and equipped in terms of the products to be made or processed in it and must be operated under positive technical control supervised by trained and experienced technologists. Products of questionable or varying quality or otherwise unsuited for the potential markets waiting for them will not result in regained prewar consumption nor in the opening or expansion of new markets essential to profitable allocation of existing milk supply to the making of the various dairy products, old and new.



Lathrop-Paulson Co. photo

One-story plant construction permits roof venting of vapor stack to eliminate steam fogging and overhead dripping. It makes possible continuous receiving, dumping and can washing. Ease of supervision aids in keeping equipment and floors clean and sanitary.



Ground floor plan of Maple Island Farm, Inc., two-story plant at Rush City, Minn., illustrates locations of service and processing areas with respect to barriers to expansion of operations on the one-story principle. Second floor is devoted to storage of supplies including milk storage tanks over first floor receiving department.

Resin-Treated Papers Provide Wet Strength To Wrappers

War-proved applications for improved wet and dry strength papers, made possible through the use of melamine formaldehyde resin, point the way to new uses in food packaging, particularly for the moist perishables

By JOHN V. ZIEMBA, Assistant Editor, "Food Industries"

MANY new food packaging uses are being found for the new, high wet and dry strength paper, which was developed during the war by Army Engineers in cooperation with the National Bureau of Standards to make war maps impervious to mud, water, oil, and grime of the battlefields. It has potential uses wherever toughness, wet-dry strength, and opacity are required.

High wet strength, made possible by the relatively new development of resin bonding, is the most important property of this paper, which resists conditions that disintegrate conventional types of paper. The secret of the paper's unusual toughness and strength is the addition of a colloidal solution of melamine formaldehyde resin to the pulp.

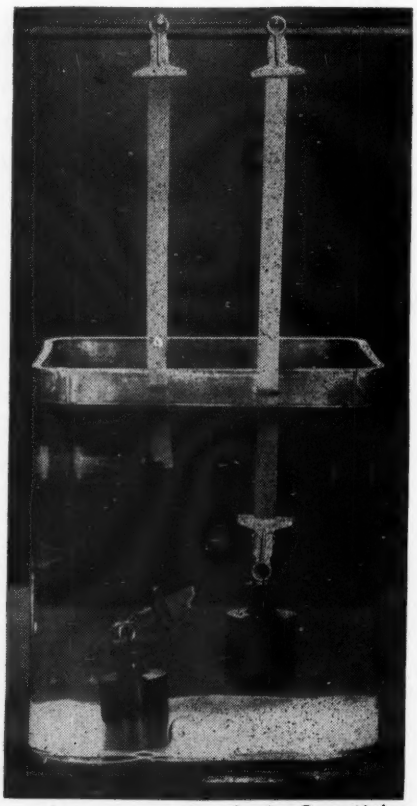
After the merit of the paper was established, the Bureau of Standards assisted industry in getting the paper into commercial production. The Bureau's pilot plant enabled them to furnish information for large scale manufacture.

Various materials, such as locust bean gum, glue and formaldehyde, urea formaldehyde resins, and viscose have been used to provide papers with wet strength. Treatments in these cases, however, are either temporary or must be applied after the sheet is formed.

Properties

Paper with the melamine resin treatment is stronger and tougher than conventional papers. The wet strength obtained is governed primarily by the percentage resin used. From 0.5 to 3.0 percent melamine resin is added. Fibers are bonded together and become resistant to separation when exposed to liquids.

The paper has improved tensile and bursting strength and increased folding endurance. Measured by the M.I.T. folding strength tester, the increase in dry folding endurance may range up to several hundred percent. Although not generally evaluated, the wet tear increase is frequently equal to the dry tear. Dry tensile and Mullen values may be increased 15 to 50 percent.



American Cyanamid photo

Wet strength test. Unbroken paper strip at right, made with melamine resin, continues to hold weight for days. Strip at left, which had not been given wet strength treatment, broke after three minutes' submersion.

Printability is improved due to lack of curl and waviness. Dimensional stability under varying humidities is also improved. This aids good register in multicolor printing. Lower basis weights are possible without sacrificing tensile and folding strengths. Wet strength papers provide better resistance to water absorption of rosin sized papers.

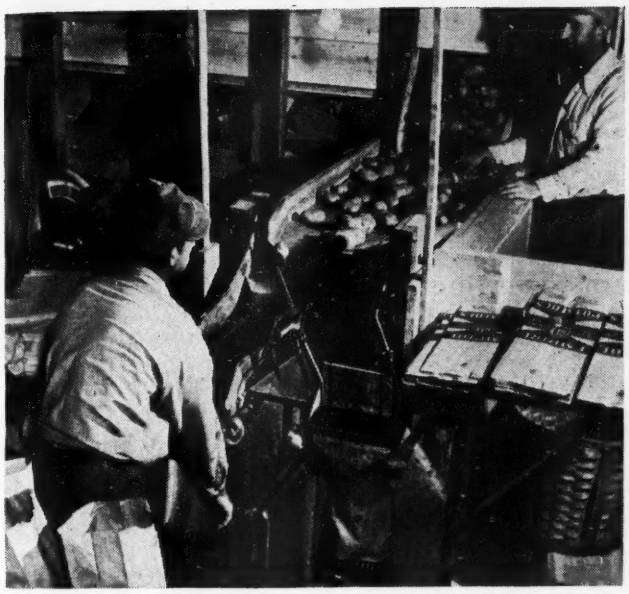
Prepackaging Potatoes

The paper shipping sack is one of the most successful uses of wet strength papers. First use of such bags was made in the shipment of potatoes. Many test shipments were made by Union Bag & Paper Corp. to develop a potato sack that would meet all problems encountered during handling, transportation, and storage. Shippers found wet strength bags satisfactory, and they are continuing to use them.

Demand for wet strength paper bags for prepackaging potatoes at the shipping point has increased. Demand has far outrun the supply.

The potato sacks are made of two or three plies of wet strength paper, based on the weight they must carry. It was found necessary to perforate the bags so as to permit the potatoes to "breathe." The bags will absorb moisture from bruised or broken potatoes without disintegrating. In addition, the bags can withstand rough handling and can be loaded or unloaded in rainy weather without breaking.

When bags of potatoes are loaded into cars in the winter, moisture arises from the potatoes and forms on the roof and walls of the car. The water then drips on the bags. Shipments in ordinary paper bags proved



Union Bag & Paper Corp. photo

Potatoes are cleaned, sorted, and packed in wet strength paper bags in 10-, 15-, and 50-lb. retail quantities. Bags absorb moisture from bruised and damaged potatoes without breaking.

American Cyanamid photo

Perishable foods, shipped in crates lined with wet strength paper, arrive at destination crisp, cold, and fresh. Liners remain strong, even though packed in ice and exposed to continuous moisture.

diastrous when burlap bags became unavailable during the war.

Growers are now shipping potatoes in 10-, 15- and 50-lb. wet strength sacks. Retail stores sell the prepackaged potatoes without further sorting, sacking, or handling. This development has revolutionized the shipping and merchandising of potatoes. The retailer receives clean, graded potatoes in retail size bags. Time and money have been saved by retail stores, and the customer receives a uniform, high quality product. The customer serves herself and saves her time and clerk time. By printing the shipper's brand name on the bags, future sales are promoted.

Previously potatoes were shipped in 100-lb. burlap bags. All sizes, grades, and quantities of culls were packed. It was necessary for retail stores to sort and sack the potatoes, and take a loss on the culls and damaged potatoes.

Through the development and use of "balers," the loading and unloading of prepackaged potato shipments have been speeded up. "Balers" are large paper bags in which four 15-lb. bags or six 10-lb. bags can be packed. The bag is sealed and handled as one unit.

Union Bag & Paper Corp. has developed wet strength paper bags which will absorb moisture on wet vegetables, cold beverage bottles and ice cream cartons without disintegrating. The new bags, called "Dolphin" bags, also do not break when used to carry moist foods in rainy weather.

Other Union Bag & Paper Corp. wet strength paper bags, fitted with cellophane windows and called "Pek" (peek) bags, are also being used to prepackage fresh produce and provide some visibility. Vegetables, moist from washing or refrigeration, can be packed in them.

Bemis Bro. Bag Co. developed a 50-lb. flour bag which kept the product dry and usable after being sent over Niagara Falls. The bag was constructed of 15 plies of melamine resin-treated kraft paper, well waterproofed and sealed.

Wet strength barrel and crate liners enable shippers to pack moist products directly into containers without losing the protective value of the paper. Wooden slat crates are lined with wet strength paper, packed with moist vegetables, and loaded into refrigerator cars into which shaved ice is blown. Fruits, vegetables, and other perishable foods reach the market in perfect condition and are far more salable due to wet strength paper protection against dust and grime en route. The paper liner remains tough, even though it is soaking wet from melting ice.

American Cyanamid photo

Wet strength wrapper will not lose strength nor fall apart when used for moist meats.

Other Uses

Use of wet strength paper enables locker operators to strip meats of their wrapper in one piece instead of scraping many separate pieces of paper from the meat. Both outer cartons and inner liners for frozen foods can be made of high wet strength material. They will be extra strong when dry and will not lose strength and fall apart even when soaking wet.

Wet strength labels for beer bottles and soft-drink bottles will remain intact, even though soaked in the ice water in a cooling tub. Melamine resin-treated papers are also being used for asphalt lamination. Fibers of the stronger treated sheets do not rub off when water splashed, and give extra protection.

The new resin-treated wrappers have other possible uses in food packaging, such as bottle cap board, bottle wrappers, box cover paper, box liners, butter wrap, celery bleaching paper, cheese wrapper, corrugated container board, fish wrapper, fruit bag paper, glassine paper, ice cream brick wrapper, milk bottle hood, oyster-pail board, poultry-bag paper, and sugar bag.

J-E: What It Is And How It Is Installed

A wage pattern that is recognized throughout the plant as equitable is a must in the present day food industry. Such patterns have to be established through precise job evaluation programs. Here is one way to do it

CLINTON J. SAMMOND, Chief
Management Division, Labor Relations Institute, New York

EQUITABLE wage structures in food plants don't just happen. They must be carefully engineered and the process designed to achieve a balanced pay scale is job evaluation.

That J-E is a welcome staple in the business diet of food manufacturing is no longer a debatable point. A survey recently completed by the Labor Relations Institute's research staff among 7,500 companies revealed that 32 percent of the food companies, which answered, had job evaluation in operation. An additional 47 percent indicated that they were contemplating the installation of J-E, while the remainder said they were not interested.

Apply to All

These figures incidentally are not exclusive with food executives. Management of other industries gave similar responses with the metal trades leading the rest in the number of job evaluations in effect.

The advantages of J-E are many and the April, 1946, issue of FOOD INDUSTRIES carried an excellent piece, which rounded up the benefits that can accrue to the company that goes ahead and sets up an engineered rate structure. The purpose of this article is to provide management with the ingredients that go into a good job evaluation plan so as to enable executives to cooperate with the engineer.

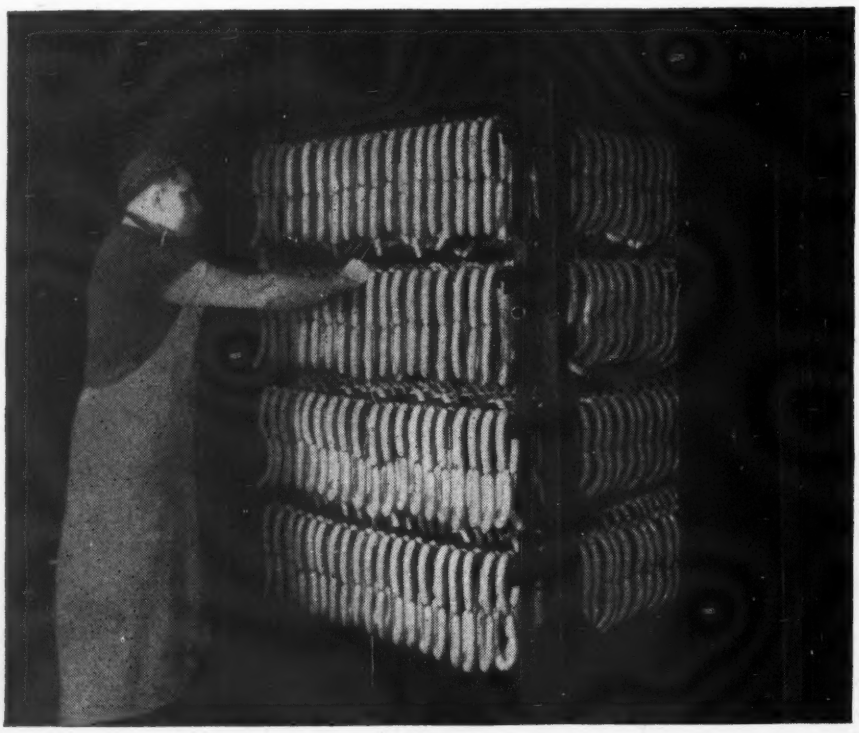
No Mystery

The first point to remember is that there is no mystery to job evaluation. There was a time when J-E was suspected by both worker and employer as some kind of fancy mumbo-jumbo. For this attitude the industrial engineering profession has no one but itself to blame because its practitioners cloaked the technics and standards with an aura of complexity far out of proportion to the real situation. Today the engineer knows that the success of a job evaluation depends first and foremost on worker-management understanding and acceptance of the whys and wherefores of the entire procedure.

Appoint Committee

That is why the first step in modern job evaluation procedure is the setting up of an employee committee. This is particularly necessary in plants that are unionized.

The principal psychological advantage of the committee system is that it impresses the workers that



What is this job worth? J-E can supply the answer.

Mimeographed forms, such as the job evaluation comparison sheet reproduced with this article or the job description and evaluation sheet, not illustrated, may be obtained by writing the Labor Relations Institute, 1776 Broadway, New York 19, N. Y., or in care of Food Industries. A description of your requirements will assist the Institute in supplying the proper forms.

management will be fair and aboveboard in the evaluation. In addition it provides an excellent medium through which employees can ask questions and have their doubts resolved. One stumbling block to the setting up of a committee in union plants is that the business agent or top labor official will often demand that the workers' group be given power to reject findings of the engineer. This should carefully be avoided. The settling of equitable wage rates is a management prerogative.

Not Too Large

Another caution is to steer clear of too large a committee. Six to ten is a convenient figure—one employee from each production department. If you have more than ten departments, you can combine representatives so that the group will not be unwieldly.

After the employee committee has been formed, the engineer should spend at least one session answering questions. Heading the list of queries will be "what happens if the evaluation shows that a job is being overpaid?" The answer is that present employees in overpaid jobs will not have their rates reduced. But, if that worker quits or is let out, his replacement will receive the evaluated rate.

Question number two invariably is "what if the evaluation shows that a job is being underpaid?" This answer is music to the employees' ears. If a job is underpaid then the rate automatically comes up to the evaluated scale. The committee business over, the engineer starts work on the technical phases of the program.

Manual of Procedure

Step one is to draw up a manual of procedure. This is essentially a breakdown of the various factors that go into each job and the assignment of definite points to each factor. These factors can be broadly classed under *skill, effort, responsibility* and *working conditions.* The points assigned to each factor may vary from plant to plant, depending on the nature of the operations. Experience is the guide to the engineer's assignment of points.

The second step is to break down the factors further. The factor of experience and training, for instance, is based upon length of service. This ranges from three points for a month or less to the full 120 points for 43 months and over. All 12 items are thus broken down and

Form 1

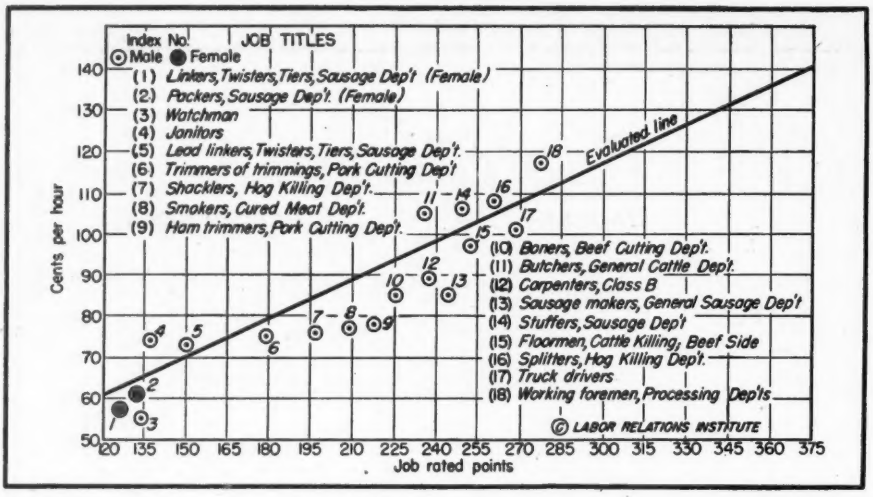
FACTORS		MAXIMUM POINTS	
I.	**SKILL**		
	Mental:		
	1. Experience and Training	120	
	2. Mental Development	120	
	3. Judgment	100	
	Manual:		
	4. Versatility	100	
	5. Accuracy	60	
			500
II.	**EFFORT**		
	6. Mental or Visual	50	
	7. Physical	100	
			150
III.	**RESPONSIBILITY**		
	8. Safety to Others	50	
	9. Supervision Exercised	50	
	10. Care Equipment and Materials	100	
			200
IV.	**WORKING CONDITIONS**		
	11. Hazards	75	
	12. Surroundings	75	
			150
	TOTAL		1,000

LABOR RELATIONS INSTITUTE

JOB EVALUATION COMPARISON SHEET

JOB No.	JOB TITLE	SKILL					EFFORT		RESPONSIBILITY			Working Conditions		
		120	120	100	100	60	50	100	50	50	100	75	75	1000
		Experience and Training	Mental Development	Judgment	Versatility	Accuracy	Mental or Visual	Physical	Safety to Others	Supervision Exercised	Equipment and Materials	Hazards	Surroundings	TOTAL POINT RATING
1	Linker, Twister, (Sausages) (female)	3	8	12	10	8	24	25	6	5	12	3	15	126
2	Packer (Sausage)	3	8	12	10	8	24	25	6	4	18	3	15	132
3	Watchman	7	4	25	10	8	10	29	3	9	30	3	5	134
4	Janitor	3	4	6	10	2	6	43	6	9	6	21	30	137
5	Lead Linker Twister (male)	7	8	12	10	8	24	39	6	9	18	3	15	150
6	Trimmer	7	8	12	25	8	24	50	6	12	18	6	15	179
7	Shackler	15	8	12	10	8	15	65	12	12	6	14	30	197
8	Smoker	15	8	12	25	10	15	50	12	13	18	14	30	209
9	Ham Trimmer	30	8	12	25	8	24	43	12	13	12	14	30	218
10	Boner	30	8	12	25	8	24	50	12	12	12	14	30	225
11	Butcher	30	15	25	25	15	15	49	12	15	6	14	30	236
12	Carpenter, Class B	45	15	25	50	10	5	38	12	14	6	21	15	237
13	Sausage Maker	45	15	25	25	15	24	52	6	17	20	3	15	245
14	Stuffer	30	15	25	25	15	24	50	6	15	15	14	30	249
15	Floorman Beefside	45	15	25	25	15	15	41	12	17	6	14	30	252
16	Splitters Hog killing	45	15	25	25	15	15	52	12	16	6	21	30	261
17	Truck Driver	30	15	25	25	15	24	59	12	12	18	21	15	269
18	Working Foreman	45	30	50	25	15	24	30	6	20	12	6	15	278

Form 1 illustrates the manual procedure, which is simply a breakdown of the factors that go into each job. The lower portion shows how the comparison sheet gives the overall picture of total point rating on all jobs and assignments in the plant.


Index No.
JOB TITLES
Male
Female
(1) Linkers, Twisters, Tiers, Sausage Dep't (Female)
(2) Packers, Sausage Dep't. (Female)
(3) Watchman
(4) Janitors
(5) Lead linkers, Twisters, Tiers, Sausage Dep't.
(6) Trimmers of trimmings, Pork Cutting Dep't
(7) Shacklers, Hog Killing Dep't.
(8) Smokers, Cured Meat Dep't.
(9) Ham trimmers, Pork Cutting Dep't.
(10) Boners, Beef Cutting Dep't.
(11) Butchers, General Cattle Dep't.
(12) Carpenters, Class B
(13) Sausage makers, General Sausage Dep't
(14) Stuffers, Sausage Dep't
(15) Floormen, Cattle Killing, Beef Side
(16) Splitters, Hog Killing Dep't.
(17) Truck drivers
(18) Working foremen, Processing Dep'ts
Evaluated line
Cents per hour
Job rated points
© LABOR RELATIONS INSTITUTE

The Scatter Chart correlates the evaluated points and rates of pay. It indicates job-pay imbalances and makes possible the working out of a merit rating procedure.

13 Checks on Job Evaluation For Food Manufacturers

Job evaluation must be cooked to fit YOUR plant. Don't try to save money by working out your own "home-made" plan.

On the question of how soon to install job evaluation, don't rush in where angels fear to tread. Give job evaluation your serious thought in terms of what you want it to do. If there's been any recent labor trouble, allow at least a month for the tempest to die down.

But once you decide job evaluation is for you, don't expect it to bottle up all your labor problems. It's an excellent technical tool—but not a substitute for efficient management.

Every employer first thinks that job evaluation will show overnight results. Not so. It takes at least six months to get results because it's planned on a long-range basis.

Very bad labor relations is to "spring" job evaluation on workers. It needs a well-planned "selling program" to put it over among workers. And don't coat your "selling" with thick cream and butter. Everybody WON'T get a raise.

Also be sure to leave the way open for settlement of individual complaints AFTER job evaluation has been installed.

Look for intangibles to register some important long-range savings. If you look for tangibles alone, you'll miss those important savings in worker morale and decreased labor turnover.

Until you're ready to have every job and operation in your organization classified and overhauled, don't think you have job evaluation. Half-way measures are worse than none.

As for time required to get job evaluation set up, don't rush the engineer. He needs time or else some serious errors will result. A few jobs evaluated each day is a full day's work.

Trial rates should not be set for new jobs. A sound job evaluation needs no trial period and new jobs just fall into line automatically.

In setting up an employee committee, don't give it veto power over the engineer's detailed findings. Limit its authority to advice-giving.

On periodic re-examination, don't tamper with job evaluation without calling in the expert. It's a permanent fixture once installed—and you may do it untold damage.

No! You don't have to be a big boy to make job evaluation pay off. Food companies going under the category of so-called "small business" can get wide benefits.

these become the working manual of the engineer.

Once the manual has been set and gone over by management, the engineer is ready for job descriptions. This is the hardest part of the program and requires keen observation along with interviewing ability.

Full Information

There is no unanimity as to which way is best for getting all the necessary details about a job. Some engineers use regular printed questionnaires on which employees check off specific answers. But information from employees is only one part of the overall task. The good engineer must obtain job detail material from every person having anything to do with a particular operation. Certainly the foreman, the superintendent, the lead man and others often play key roles as sources of information. For that reason the engineer must have the facility for handling people on all rungs, both up and down the industrial ladder.

Once the material has been gathered for a particular job, the findings are set down on a job description and evaluation sheet. This describes both the job requirements and the full qualifications of the employees. This is done for each job and when finished the engineer is ready for Form 2, the comparison sheet. This sheet gives the engineer an overall picture of the jobs, points and the factors. As a result of this breakdown it is possible to see how one job compares with another. Sometimes slight changes have to be added here to bring the various tasks in a relative line with each other.

Scatter Chart

The engineer now has enough material to meet with the committee and show it the results to date. Questions are asked and answered and suggested changes sometimes come up. Those that are right are incorporated in the evaluation.

With all the jobs analyzed and okayed by management, the next step is to draw up a Scatter Chart. This is an engineering term that describes the technic for correlating the evaluated points and rates of pay. It is illustrated in the chart. Note that the current rates are "scattered" on the chart. The straight line, which indicates the evaluated rates, is arrived at through the theory of least squares, a statistical technic used by most present day engineers.

The chart indicates the overpaid as well as the underpaid jobs. It is also possible to work out rate ranges from this chart so that the company can install a definite merit rating procedure. The rate range for each job is usually worked out between management and the engineer. There is no one infallible method. Much depends on company policy, on wage increases, and on industry practice.

Fall in Place

It is easy to see how, with the evaluation in effect, new jobs can be graded almost automatically. The factors are pointed up, the description obtained and the point score is then measured into the chart. This procedure makes it virtually impossible for new jobs to be set out of line.

The tremendous advantage of job evaluation is that once installed it becomes a permanent part of a company's personnel procedure. Its technics are simple enough for the average personnel man to learn after a short period of training.

High Vacuum Technics Utilized For Drying Orange Juice

Powder is being produced commercially by Vacuum Foods Corp., which has been concentrating juice for distribution in frozen form. The powder is produced from concentrate in vacuum driers, then canned. Reconstituted products are nearly equal in taste to fresh orange juice

By L. V. Burton
Editor of "Food Industries"

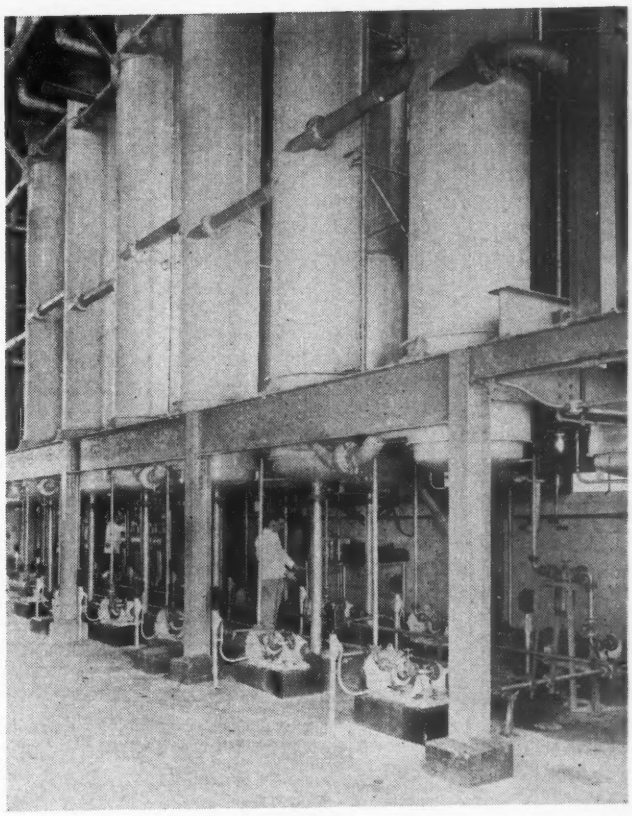


Fig. 1. Juice is concentrated fivefold under vacuum of 12-15 mm. This is one of the two banks of concentrators. Tanks, water jacketed, are 28 ft. high.

COMMERCIAL production of frozen orange concentrate began in April, 1946, at the new plant of Vacuum Food Corporation, Plymouth, Florida, after four years of engineering and scientific research and one year of pilot plant studies. Preliminary operations with orange juice powder have been initiated and large scale production will shortly be under way. The process, developed by National Research Corporation, of Boston, is based on the well-known principle of physics that as the external pressure upon a liquid is reduced, its boiling temperature is lowered. To the foregoing extent, the process is time tested, but in the application of the principle of sound engineering design, Vacuum Foods Corporation now has a plant that utilizes equipment quite unlike anything I have ever seen before.

Fortunes have been spent in trying to preserve orange juice in a form that will retain all the palatability of the fresh juice. It has been a difficult problem to solve, yet each effort brought the solution closer and resulted in a product better than its predecessors.

One of the important, though unsuccessful, variations of the attack on the problem of preserving full strength orange juice occurred in 1931, when several big and many small firms attempted to freeze it for commercial distribution by many variations of the quick freezing method. Unfortunately, very little was known about enzymes and their control—even in those recent years—and though well over a million dollars was spent that year in Florida alone the principal profits went to the hotels and railroads. From January to April of 1931 every train entering Tampa carried from five to ten passengers intent on learning at first-hand about this spectacular but very short-lived new enterprise. The trouble with the product was that it went off flavor in freezer storage. Much of it acquired the hay flavor of improperly dehydrated vegetables and resembled orange juice only in color.

In that same year, 1931, another pioneering company produced a citrus concentrate at Clearwater, Florida, by vacuum evaporating the juice produced by hand reaming. As I recall it, the juice was concentrated 7-fold and packaged in barrels and kept in cool storage but not frozen. It fared but little better than the quick frozen orange juice of that day. The failure of the Clearwater enterprise seems in retrospect to have been due to three things: the depression, high manufacturing costs, and inadequate quality.

The instability of citrus juices was the serious obstacle to success. Heat destruction of the enzymes that brought about oxidation then seemed to be the only sure way to stop oxidation. Yet though heat sterilization of the juice would both stabilize and preserve it, the end product had a cooked flavor that was at a very serious disadvantage when compared with fresh juice or fresh fruit.

Canned orange juice of that day was far from what it is today; in fact, it was often very sad. But somehow enough people would purchase the product to keep the indus-

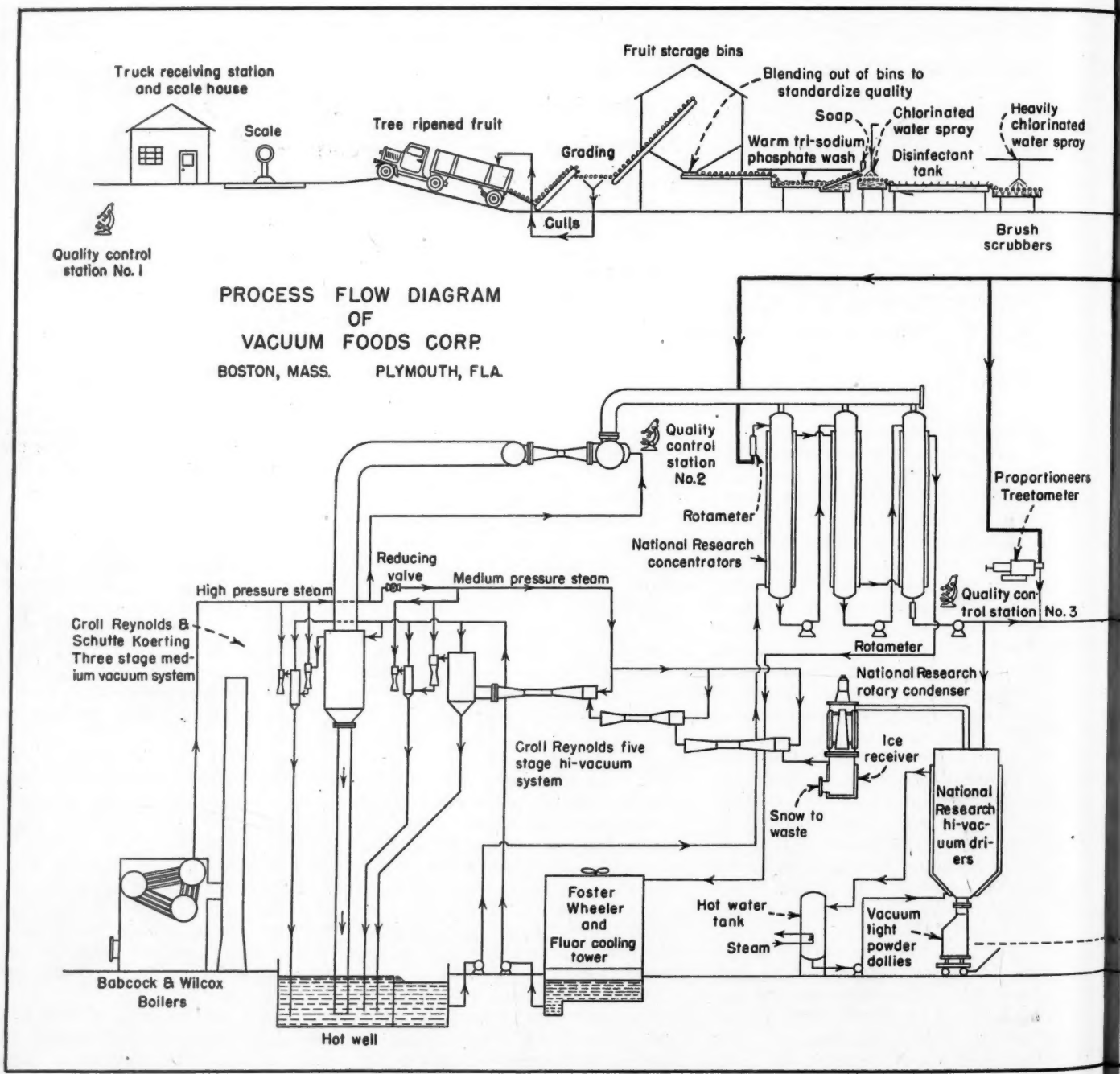
try alive and to encourage the expenditure of more millions of dollars in an effort to find the successful method of retaining the heat sensitive flavor of the orange in a preserved form.

One line of development has led to the S.T.-H.T. (short time, high temperature) pasteurization of deaerated, deoiled juice followed by filling into hermetically sealed containers without any further process, and storing at temperatures below 70 deg. F. This is the canned orange juice of today, consumed in huge volume.

A second line of development has led to the concentration of the juice in a vacuum evaporator, packaging in cans and freezing. The product is sold as a frozen concentrate. It is not sterilized by heat, for that would impair the flavor. Several firms, including Vacuum Foods Corp., have been marketing the frozen concentrate with considerable success. Vacuum Foods, however, operates its concentrating process at considerably higher vacuum and hence lower temperature than other processors. Technical details of the manufacturing process will be described further on. One important feature of this method is, however, the discovery that the high acidity of a concentrated juice serves to retard enzyme activity and thus prolongs the merchantable life.

Dehydration

A third line of development has led to the dehydration of the concentrated juice to a hygroscopic, orange colored powder containing less than 1.5 percent of water. If this powder is immediately packaged in hermetically sealed contain-



Flow sheet of Vacuum Foods Corp. operation at Plymouth, Fla., shows high vacuum equipment.

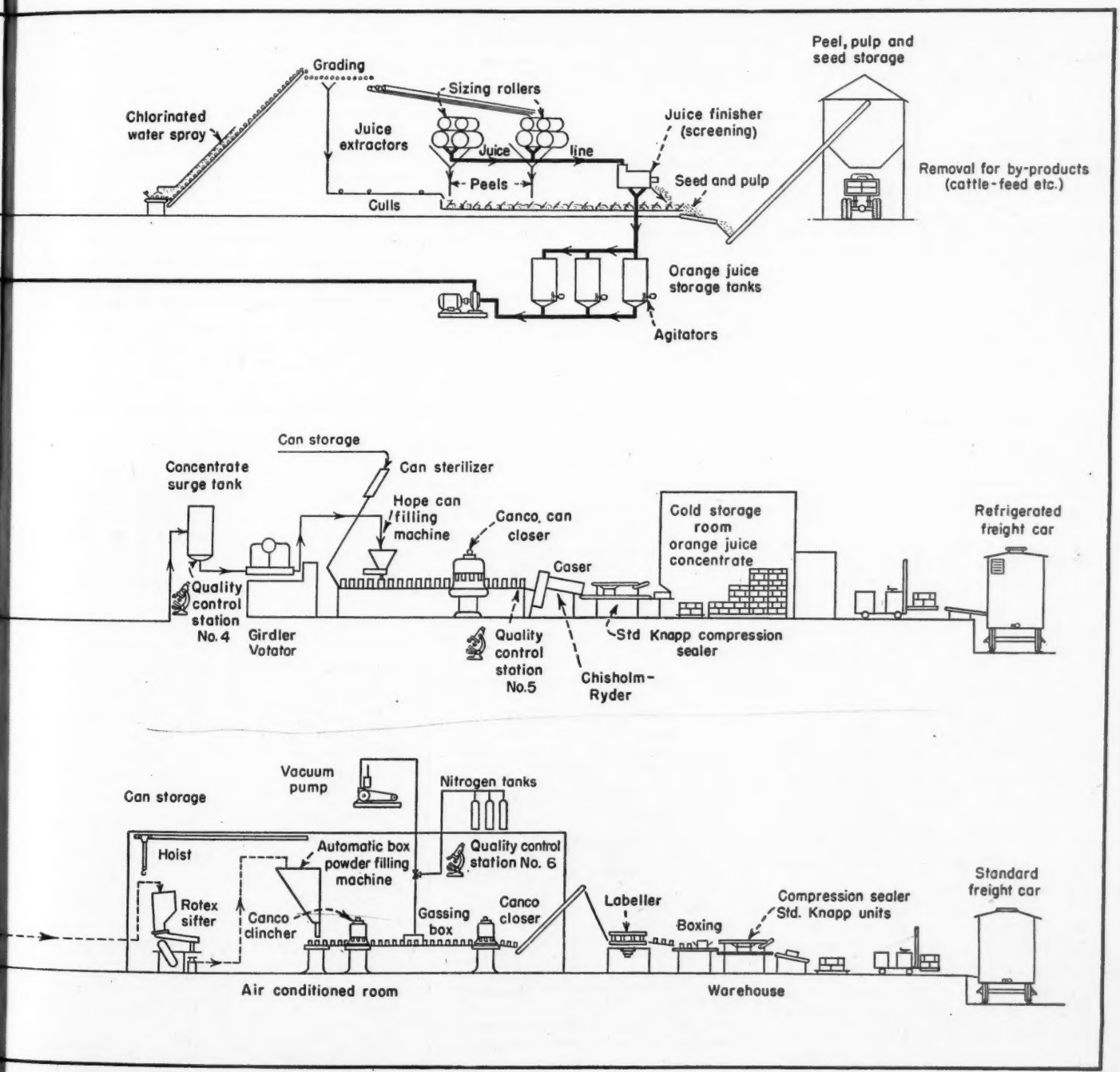
ers free from air and stored below 80 deg. F., it has a very considerable merchantable life and will reconstitute into a product that is excellent, though not the exact equivalent of freshly squeezed juice. As far as my personal experience with powered orange juice goes, I should say that the two-month old powder I have tested was the equivalent of the juice of fresh oranges that had been held for several hours under refrigeration in a manner that many restaurants are accustomed to do. There is, however, a slight difference between the reconstituted juice and the fresh juice held for a long time, with the difference in favor of freshly reconstituted juice made from the powder.

Vacuum Foods Corporation is, I believe, the first to produce a successful commercial orange powder. It will soon be engaged in large scale production of the commodity. All is currently earmarked for European shipment. Except for possible market tests in the United States, little of the powder is expected to be available for the domestic market as long as the present export market continues.

Describing the Process

While Vacuum Foods utilizes well-known principles of physics and food technology, the equipment other than the preparation equipment is largely of its own design. Since patent applications are still being made, a complete disclosure of the internal workings of some of the equipment cannot be made here.

In general, however, the following steps are involved: production of the best possible juice from a suitable blend of oranges under the most sanitary conditions possible (for technical—not esthetic—rea-



Quality control stations are established at the six points designated by the microscope symbols.

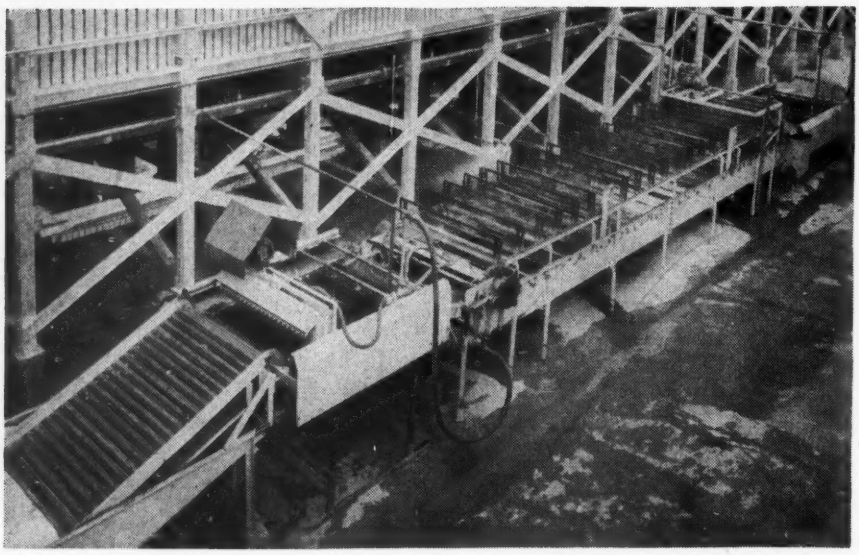


Fig. 2. Washing of the fruit, important in keeping down bacterial counts, is an outdoor operation. Left to right, the oranges pass through trisodium phosphate solution, soap suds, chlorinated water, germicide (4 min. soak), chlorinated water.

sons); concentrating the juice by evaporation under vacuum at an unusually low temperature; restoring some of the lost volatiles by addition of fresh juice; and freezing the concentrate in cans; or drying the concentrate to a powder under high vacuum, packaging the powder in an air conditioned room, and gassing the powder with nitrogen to remove nearly all the oxygen from the cans.

Juice Preparation

All well-operated juice departments receive oranges by lots into what are termed baffle bins where each lot is kept separate, zig zag baffling being used to prevent any bruising of the fruit by actual droppings. Lots are analyzed and the correct blending is ordered by the quality control department to produce a standardized juice, the blend being made by mixing the fruit, rather than the juice. Sorting of the fruit to remove any defects precedes placing it in the bins. Rejected fruit is returned to the seller.

Production of juice from oranges presents one problem that is not common in other branches of the food industry. Fruit that has been processed through a packing house has been put through a special process to wax the surface. Furthermore, color has sometimes been added where the varieties are those that are partially green even when ripe.

It is regarded as imperative by Vacuum Foods Corporation to remove all the waxy material that may imprison considerable numbers of bacteria in addition to the collections of dust and sprayed chemicals from the outside of the peel. This is done before pressing the oranges to extract the juice lest the juice become bacterially contaminated in the juice extractors. Hence the initial step in preparation is an elaborate cleaning system. (See Flow Diagram and Fig. 2.)

First comes a wash in a warm trisodium phosphate water solution. This is followed by a soap suds application and a thorough scrubbing with rotary brushes. The soap is then removed by a chlorinated water rinse. The oranges next go into a germicide tank where they are held four minutes. The germicide is then removed by a second scrubbing operation performed under sprays of chlorinated water. From the time the fruit leaves the chlorine rinse the oranges travel on balata belts (rubber or plastic belts will be purchased when they become available) that are constantly recleaned by chlorinated water sprays on the returning belts.

In an out-of-doors operation, such as this, it is impossible to achieve absolute sterility. It is both feasible and necessary, however, to keep the counts of organisms as low as possible. High counts are associated with off-flavors, hence the need to keep the oranges nearly sterile. A further necessity is to be certain that no coliform bacteria are present, for the process does not employ temperatures high enough to destroy pathogenic organisms.

The cleaned fruit is elevated to the juice extraction department, where it is given a second inspection, size-graded and then extracted in Rotary Press Co. automatic machines, the sizing being done to insure that proper sized fruit goes into each machine for the most efficient operation.

Extracted juice is run through a rotary sieve finisher, next collected in agitated surge tanks, then pumped to the concentrator columns, designed by National Research Corporation. These are two separate banks of vacuum evaporators, each bank having a juice capacity of over 1000 gal./hour. The concentrators are 13 empty tanks 28 ft. high x 30 in. diameter. To supply the latent heat of evaporation the walls are jacketed with hot water that comes from the barometric condenser via the hot well. Each column has 200 sq. ft. of evaporating surface and the vapor and juice leaving the columns are maintained at 50 to 55 deg. F. The heating surface is, of course, considerably warmer, but is not hot enough to injure the flavor.

Juice is sprayed onto the heated walls of the interior of the columns in which a vacuum of 12-15 millimeters of mercury is maintained. As the juice trickles down the column it gives up a part of its water by evaporation. On reaching the bottom it is pumped to the top of the next column by small, motor driven centrifugal pumps and the procedure is repeated, and so on through the series of 13 columns.

Though the evaporation is done in series, it is emphasized that this is not a 13-effect evaporator. If it were a multiple effect evaporator, as is used by some concentrate processes, the first effects would necessarily be too hot for the juice and flavor loss would result.

The vacuum of 12 to 15 mm. of mercury is maintained on one bank by 4 Croll-Reynolds 24 in. booster-

Norman V. Hayes

For further discussion of the principles and practice of orange juice dehydration, the reader is referred to the following: Norman V. Hayes, Robert H. Cotton and Wallace R. Roy, Problems in the Dehydration of Orange Juice, *Proceedings of the American Society for Horticultural Science*, vol. 47, 123-129, 1946.

Operations at the Vacuum Foods plant are based to a large extent on this publication. Norman V. Hayes, one of its authors, was head of dehydration research at National Research Corp., and had charge of the pilot plant in Florida. He was accidentally killed while supervising the erection of the full scale equipment. The tragedy occurred four days before the plant was scheduled to open.

ejectors and on the other by 3 Schutte-Koerting 28 in. booster-ejectors exhausting into two large barometric condensers. A low residual air-pressure is maintained in each system by means of small two-stage steam ejectors connected to the barometric condensers.

Coming from the concentrator the juice has been concentrated to about 50 deg. Brix, which represents about a 5-fold concentration. During the boiling that has taken place in the vacuum some of the delicate flavors of the orange have been carried away. The next step, where the frozen concentrate is the desired end product, is to restore the lost flavor by combining fresh orange juice with the concentrate to bring it down to 42 Brix by means of a Treet-O-Unit made by Proportioneers, Inc.

This restoration of natural flavor to the concentrate was developed by Dr. L. G. Macdowell of Florida Citrus Commission. The Treet-O-Unit is a small air operated pump, actuated by a liquid meter on the pipe line that carries concentrate to the mixing tank. A special gear train is built into the meter and is calculated to give approximately the proper proportioning of juice and concentrate.

A further adjustment of the proportioning is needed, however, for oranges are a variable raw material. Despite the efforts to blend the fruit before juicing, the Brix reading of the concentrate will vary at times. This variation can be compensated by an adjustment of the stroke of the Treet-O-Unit. The adjusting wheel, being geared to a small counter, makes it possible to calibrate the proportioner's setting for every Brix reading of the incoming concentrate.

Freezing the Concentrate

Something akin to quick freezing of the concentrate is necessary to avoid the formation of a metacryotic core (liquid core) in the cans. Such a core would develop if the concentrate were filled into cans at room temperature and then frozen quiescently in a cold room. This liquid core could be the site of bacterial action that should be eliminated; but, more important, it would represent a more highly concentrated portion of the juice than the surrounding ice, and would make it impossible for the user of a part of a can of concentrate to obtain a uniform portion unless the entire contents were thawed and mixed. To avoid these possibilities the company has borrowed a practice from ice cream manufacture and partially freezes the concentrate in a Votator before filling into cans. At the Votator outlet the temperature is 16 to 18 deg. F.

As originally planned, about 12 percent of the water in the concentrate was to have been frozen, giving a slushy, plastic mass, but this figure has not been attained in practice because the filling machines were unable to handle the mass satisfactorily. Hence it was necessary to back off a little and freeze only 6 to 10 percent of the water.

In the filling department are two 3-tube Votators for 6-oz. and 27-oz. cans, and one 2-tube Votator for the 5-gal. cans. Small cans are filled on a gang filler made by Hope Machine Co. (see Fig. 7), then are cased and sealed in a Standard-Knapp sealer and run into the cold storage room held at –10 deg. F. by a York Corporation refrigeration system. With the initial freezing given by the Votators, the cans are solidly frozen in 4 hours after placing in freezer storage.

Shipments are made in refrigerator cars or trucks from the foregoing stock.

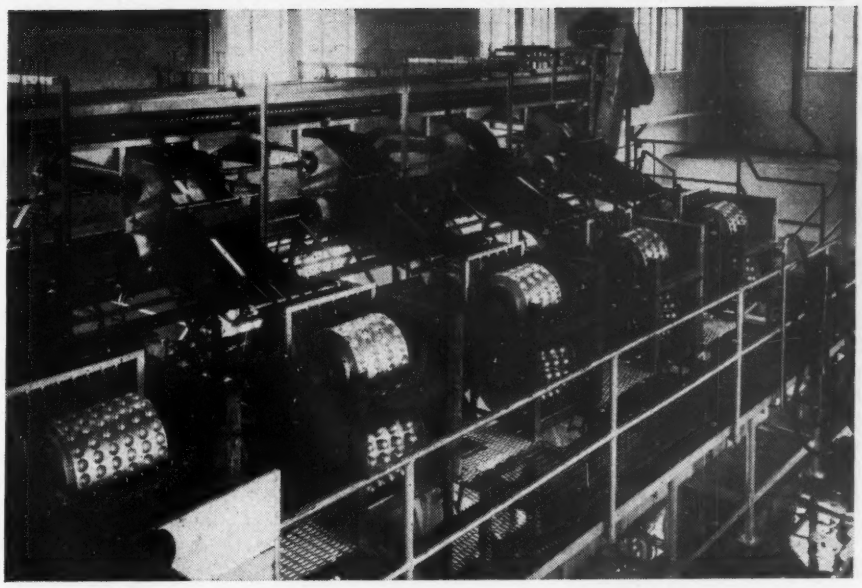


Fig. 3. Sizing of fruit assures efficient juice extraction. Size-grading rollers are placed above Rotary Press Co. juicers which cut halves and then squeeze them.

Distribution

Vacuum Foods Corp. is selling its 4 : 1 orange juice concentrate to institutions under the company's trade name of Minute Maid. This is a No. 2½ can that makes seven pints of orange juice.

A retail size package of 4 : 1 concentrate is available under the trade name of Snow Crop. This is a 6-oz. size that makes 1½ pints of orange juice.

The dried material will be available for the domestic market in the near future. It will be packed in 2-oz. cans the contents of which will reconstitute to a pint of juice. Powder is being packed also in No. 2½ cans containing 12 oz., sufficient for three quarts of juice. Crosse and Blackwell, Baltimore, are handling distribution of the powder.

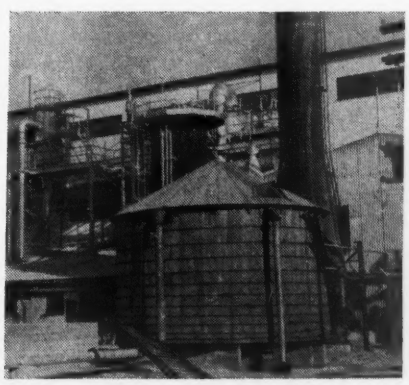


Fig. 4. Barometric condensers, used in the vacuum concentrating and drying systems, are installed outside the plant.

Powdered Orange Juice

In a superficial way the powdering units resemble the concentrating columns, being of much the same size. Fig. 5 shows the top view of a few of the ten units now in operation. A vacuum of 500 to 700 microns of mercury is maintained in the driers during the drying cycle. One micron is 0.001 millimeter of mercury, and air at sea level has an average pressure of 760 millimeters. Hence the vacuum used during the drying is about ½ of 1 millimeter. In the thinking of National Research Corporation, 500 microns is not very much of a vacuum, for their diffusion pumps can carry it down to a thousandth

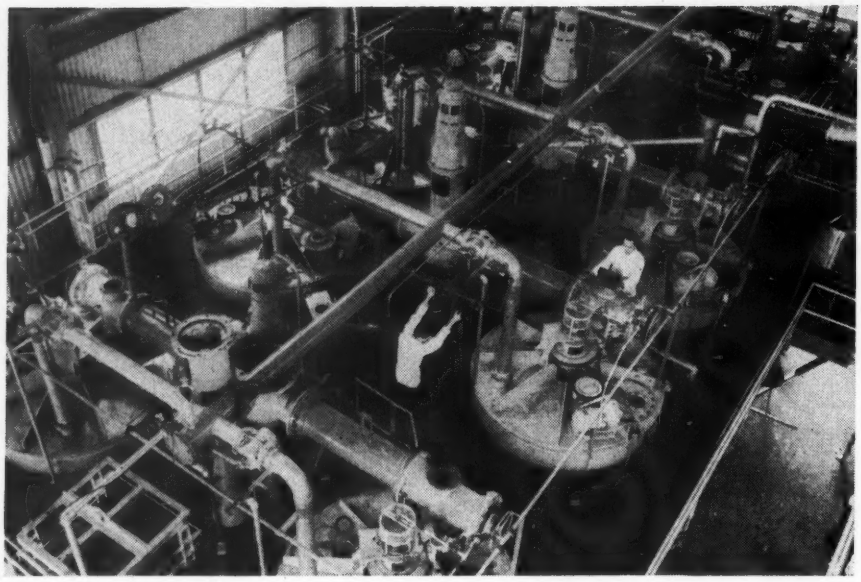


Fig. 5. National Research Corp.'s wartime developments in high vacuum technic were utilized in designing this battery of powder driers. Each drier can produce 450 lb. daily. Two of the rotary condensers can be seen (top center).

of a micron. Research has established, however, that the steam jet vacuum is sufficient for satisfactory operation. A secondary drying operation, using diffusion pumps, can be eliminated. In the N.R.C. pilot plant, air pressures as low as 20 microns have been attained with steam ejectors.

Vacuum Engineering

A brief digression is necessary to explain how high vacuum is produced economically. To anyone experienced with vacuum, it is well-known that high vacuum is a very specialized field, and the handling of highly attenuated gases is not the easiest job in the world.

As pressures are reduced, gases (such as air or water vapor) will expand. When pressures are reduced to microns (1 mm. of mercury = 1000 microns) the expansion is enormous—even astronomical. The formula for calculating the expansion of a given volume of a gas with changes in pressure at constant temperatures is:

$$PV = K$$

where P = pressure
V = volume
K = a constant

A cubic foot of dry air at 70 deg. F. and 760 mm. pressure weighs 0.075 lb. Reduce the pressure to 1 mm. and it still weighs 0.075 lb., but its volume is now 760 cubic feet.

Reduce the pressure still further to 100 microns (0.1 mm.), and the volume increases to 7600 cu. ft. Take it down to 10 microns and the original cubic foot of air has now expanded to 76,000 cubic feet. At 1 micron of pressure it expands to 760,000 cubic feet. It is possible to go to still lower pressures—even to 0.001 micron. At that pressure our original cubic foot of air will now occupy 760,000,000 cubic feet and it still weighs 0.075 lb.

If we are pumping out water vapor by means of high vacuum we shall find that it expands in exactly the same way. But water vapor will condense and freeze if the temperature is sufficiently lowered. Air, on the contrary, is a non-condensible gas, save at extreme low temperatures.

Formula for calculating effect of temperature at constant pressure without condensing the gas is:

$$\frac{V}{T} = K$$

where V = Volume
T = Temperature (absolute)
K = a constant

This relation holds until the gas (which in this case is water vapor) condenses. After that it does not contract as a gas but as a liquid. It is possible to reduce the temperature still further and freeze the liquid. And by doing this a marked reduction in volume of the gas has been brought about. For ice has a very low vapor pressure.

For the foregoing reason a vapor trap is put into high vacuum evaporating systems to freeze out the water vapor and thereby keep the volume of gas to be handled down to a reasonable amount. To have equipment large enough to handle the astronomical volumes of gas at pressures near 1 mm. would involve prohibitive cost.

Hence, between an evaporating vessel under high vacuum and the vacuum pump, it is customary to insert a vapor trap with its body refrigerated to –50 deg. F. or lower.

(*Continued on page* 228)

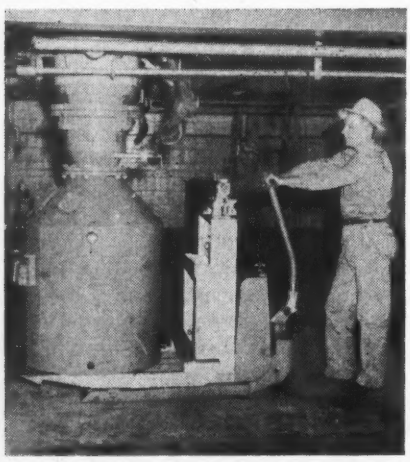


Fig. 6. Powder from driers is dropped into vacuum "dolly," then taken to fillers.

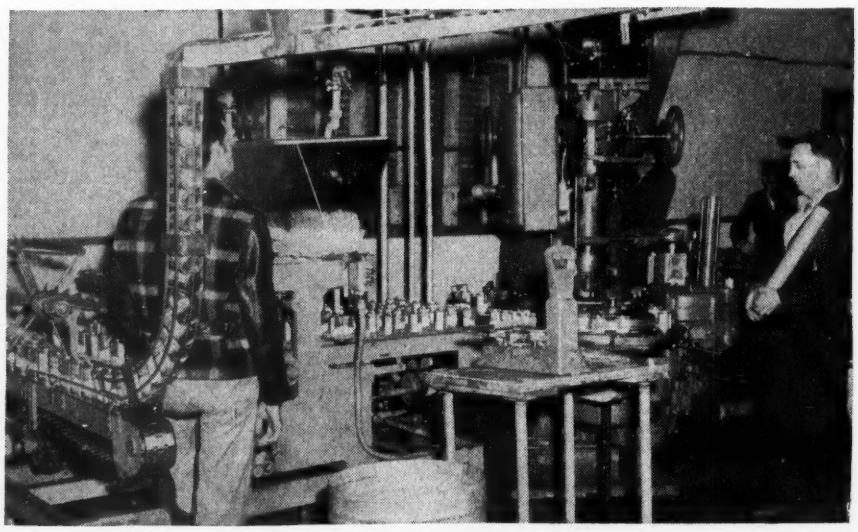


Fig. 7. One of the filling rooms. Frost can be seen on hopper of gang filler. Powder is filled in another room, air conditioned. Cans are gassed with nitrogen before closing.

How To Control the Quality Of Frozen Cooked Foods

Raw materials, processing, sanitation, distribution and marketing must be considered in setting up a control program. Limits are proposed for E. coli index and total bacteria count in raw and processed materials

By GERALD A. FITZGERALD, Director, Frozen Food Foundation, Inc., Syracuse, N. Y.

A QUALITY control program for frozen cooked foods entails controlling: (1) The quality of raw materials; (2) the quality of foods during processing; (3) the quality of foods by adequate plant sanitation, and (4) the quality of foods during distribution, marketing and consumer handling.

The quality control program must begin on the range. The quality of cattle determines the stability of fat laid down. The fat of corn-fed cattle is less susceptible to oxidative rancidity than that of most grass-fed cattle. Consequently, frozen cooked beef and beef dishes should be prepared from high grade cattle.

Quality of Raw Materials

Freshness of raw material is important. For example, ingredients used for hamburger such as plates and navels, should not be stored at room temperature for the following reasons: (1) Incipient oxidation of the fat takes place, resulting in progressive oxidation even when the product is packed under an inert gas; (2) enzyme "ripening" or decomposition occurs, and (3) bacterial putrefaction results. The latter two processes cause off-flavors, which influence product flavor.

Bacterial decomposition of the fats sets up a lipolysis, which continues at low temperatures. Thus, perishable ingredients should be refrigerated at all times, since oxidative and lipolytic rancidity are probably the chief factors which shorten the shelf-life of frozen cooked foods. The shelf-life of pork and turkey products is shorter than beef or chicken products because their fats are less stable.

Auxiliary ingredients, such as milk, flour, spices, potatoes and other vegetables must be of high sanitary quality. Their freshness must be assured by prompt handling, protection against contamination by a continuously applied sanitation program, and by preventing exposure to bacterial incubation temperatures during processing.

Vegetables cannot be handled during processing for freezing as they would be handled during preparation for immediate serving. Vegetables appear mushy or overcooked, unless special precautions are observed. In many cases, certain varieties of vegetables and vegetables at different stages of maturity are entirely unsuitable for freezing. Freezing and cooking affect vegetables in the same way, structurally. Therefore, vegetable components of frozen precooked foods should be undercooked during processing so that the flavor and texture will be normal when the foods are reheated for serving.

In the case of meats, the processing requirements are different because freezing tenderizes the meat constituents to a lesser extent. Consequently, meat components should be thoroughly cooked.

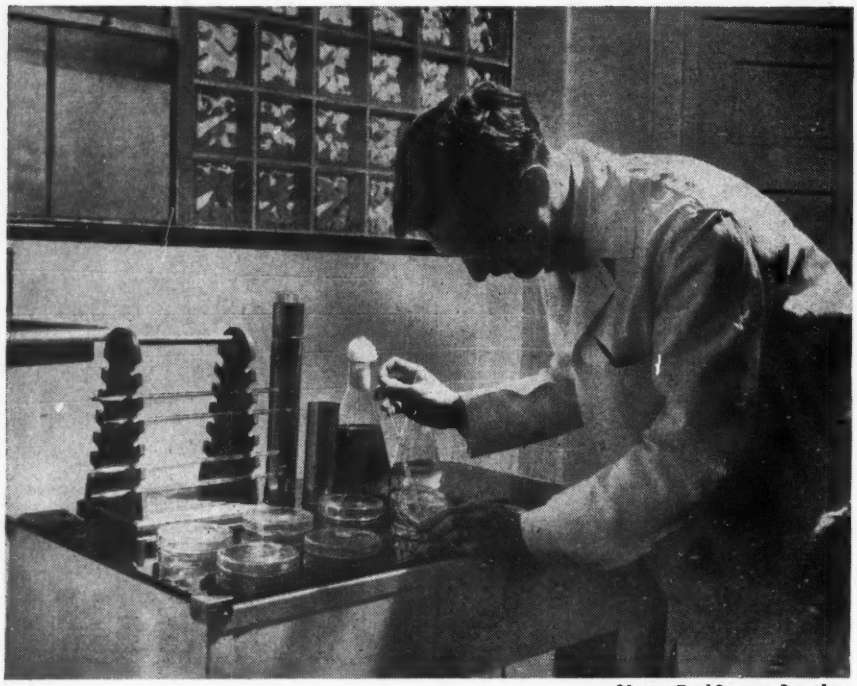
Effect of Processing

Quality changes during processing may be caused by poor control of the process itself or by microbiological changes. Speed of handling is necessary at all stages. Products may be hot-filled to effect sterilization of the container and its contents prior to freezing. Hot filling, however, may affect quality through overcooking. Therefore, after a reasonable sterilizing period, the package should be "quenched" in water to stop further cooking of the vegetables. The exact set of allowable conditions must be worked out for each product.

To hot-fill, the package must not be affected by the heat nor by subsequent quenching. If the container will not withstand such conditions, then the product must be precooled before filling. This requires stricter sanitation control during handling and processing. Whether cooling is accomplished before or after packaging, the time the product is allowed to remain within the incubation range of 130 deg. F. down to 50 deg. F. should be reduced to the absolute minimum. In the case of hot-filled products, rapid cooling is effected by placing the hot packages immediately in the freezer. Larger and more expensive refrigeration equipment is necessary in this case.

With hot filling, also, the product may be adversely affected if the wax coating melts, thus: (1) Paraffin odors and flavors may contaminate the product, unless it is packed in an inner pouch or liner; (2) the wax coating may become thin in spots and lose its protective value, or (3) the wax may recrystallize into larger crystals and become more brittle, thereby reducing the protective value of the package when handled at low temperatures.

The method of processing may affect quality adversely. Batch cookery appears to be a carry-over from the kitchen-type procedure. Processors have had poorer results with large batches which usually mean the use of steam-jacketed kettles.



Maxson Food Systems, Inc. photo

To control the quality of frozen cooked foods, all raw ingredients and the final products must be constantly checked by trained bacteriologists. Standards should be established for total bacteria count and most probable numbers of E. coli.

Stock-pot cookery, on the other hand, has been successful.

Intensive application of all phases of food technology will be required before all processing problems are solved. For example, temperatures and pressures in steam-jacketed kettles must be controlled. Various size kettles for different size batches are necessary to prevent scorching, irreversible coagulation of proteins and flavor loss. Foods being processed should be filled to a higher level than the height of the steam jacket to avoid cooking the film on to the wall of the kettle. The film may scorch and cause off-flavors.

An auxiliary processing step to consider is homogenization. In some cases it may prevent trouble. In other cases it may result in less-pronounced difficulties, not easily associated with off-quality conditions. Fats are dispersed into a more or less stable emulsion, depending on conditions. Stable fat dispersion may prevent curdling which may be caused by a break in the emulsion. Homogenization, on the other hand, beats air into a product. Although much of this air is eliminated either before or during freezing, a portion is dissolved or entrapped. Conditions are then ideal for oxidation of the food during storage. Now that this condition has been recognized, equipment is being developed which can affect homogenization without incorporating air into the product.

Complexity of the Problem

Frozen cooked foods may contain precooked meats or meat dishes in combination with precooked vegetables. They may be either a one-dish meal such as stews, or plate meals with the meat and vegetables separated in different sections of the same package.

Specific products present specific types of problems. Chicken a la king, containing milk or egg products as thickening agents, presents its own problems. The problems are different with Hungarian goulash, where the gravy is thickened and concentrated by long, slow cooking in an open kettle. The problems are again different with lamb stew, where a broth or thin gravy is thickened with flour. Different problems also arise in the manufacture of corned beef hash, where chopped meats are mixed with other ingredients.

The meat portion may present one problem, while the gravy or sauce presents another. When fried chicken becomes rancid during storage, susceptibility of chicken fat to rancidification may or may not be the cause. It may be the cooking fat. Selection of a cooking fat that is less susceptible to rancidity may prolong the shelf-life of fried chicken. Use of antioxidants such as nordihydroguaiaretic acid (NDGA), d-isoascorbyl palmitate, and mixed tocopherols in the cooking fat may further prolong shelf-life.[1]

Covering fried chicken with a thickened sauce or gravy will prevent direct oxidative rancidity by protecting the fat from direct contact with air. This is also true in the case of other types of meat dishes. Use of gravies, however, introduces other problems. Freezing coagulates milk, cream, and flour base gravies and sauces to a greater or less degree. Homogenization may prevent this coagulation. Use of homogenized milk, on the other hand, usually aggravates the degree of "curdling." The amount of fat in the gravy affects the stability of the product. Other factors influence product stability. These include speed of freezing, type of starches, type of spices and other ingredients, freshness of raw material, bacterial contamination of material, quality of packaging materials, and uniformity of storage temperature.

Quality and Plant Sanitation

Many opportunities for bacterial growth occur during the processing of frozen cooked foods. Vegetable and gravy ingredients may be greater offenders than meat components, but this is not always the case. Meat may be easily implicated.

Animal fat contaminates the surface of all handling equipment and containers with which it comes in contact. It cannot be cleaned off such surfaces easily. Grease films, if allowed to accumulate, usually contain enough protein material to serve as an excellent culture medium for putrefactive types of bacteria. To avoid this condition, grease films must be removed continuously from all equipment. Hot water, containing a suitable soap, must be applied to saponify the fat. Hot and cold rinses must follow. Storage cans for trimmings, for instance, must be washed and sterilized after each use. This is a major operation in a meat plant, compared with a vegetable cannery where films can be prevented by continuous rinsing of equipment with cold water sprays. When metal containers are bent or cracked, the container must also be steam-hosed as a further precaution. Unless the whole system is suitably mechanized, clean-up becomes expensive.

Sanitation Standards

Quality control, production and engineering departments must cooperate in setting up suitable sanitation standards, with emphasis on measures for bacterial plate counts.

Although it may be possible to pack to a plate count of 10,000 bacteria per gram, a leeway of 1,000 percent variation may be necessary. In such cases, a maximum of 100,000 bacteria per gram should be set and strictly adhered to. On the other hand, many products should not be rejected unless counts higher than 500,000 per gram are obtained.

In setting up sanitation standards for cooked foods, more must be considered than the final product. Raw ingredients also must meet the standard of the final product, say 100,000 bacteria per gram. Although a freshly frozen cooked product may contain a maximum of 100,000 organisms per gram by plate count, the maximum direct microscopic count of the original ingredients, including cells of bacteria killed by cooking and freezing, may be set at 1,000,000 in the case of some products. In products such as hash and hamburger, counts would thus be lower than usually found when these products are marketed unfrozen. It is essential that such low limits be maintained if good keeping quality is to be achieved during low temperature storage and after thawing.

E. coli Standard

Frozen cooked foods should be looked upon as potential health hazards. They should be processed and handled to prevent contamination with pathogenic bacteria. Some yardstick must be set up to measure such contamination. The confirmed test for fecal coliform contamination is considered by most sanitarians as a satisfactory index. This index is not a gage of bacteria of air- or water-born origin. It indicates bacteria of human or animal intestinal origin. Rodents, cats, and dogs, therefore, must be kept off the premises at all times. Flies can carry coliform organisms from toilets in the plant or in the neighborhood. Food packing premises, accordingly, should be thoroughly screened.

Finally, continual inspection of the health and in-plant sanitation habits of employees is paramount. Not only food handlers but also equipment handlers must be checked. When precautions are taken, it will be easy to meet a standard M.P.N. (most probable number) of 100 coliform bacteria per 100 g. Of course, even this value indicates possible contamination. Only an M.P.N. of 0 coliform organisms per 100 g. indicates freedom from danger.

TABLE I—Total Plate Count and M.P.N. of E. coli in Frozen Precooked Foods Packed by a Small Processor for Sale Through the U. S.

Product	M.P.N. value*	Total plate count**
Chicken noodle soup	460	30,000
Chili con carne.....	1600***	30,000,000
Beef stew	18	300,000
Turkey ala king....	330	300,000
Meat chop suey.....	0	45,000
Meat balls and spaghetti	0	30,000
Meat loaf	61	30,000

*Most probable number of coliform organisms per 100 grams.
**Total number of bacteria per gm.
***Tubes positive in all dilutions.

The processor of frozen cooked foods must realize the responsibility he assumes. He must prevent any possibility of an epidemic. There are fortunately a few definite precautions which can practically guarantee against contamination.

Where the processor is overly cost conscious, it is most difficult to establish the quality control program on an efficient basis. When extensive automatic sanitation controls are installed in a plant that is equipped to meet the sanitation standards mentioned, the only remaining need is to install a well-organized clean-up program with adequately staffed and equipped personnel. The initial cost may be expensive, but it should be considered as important as fire insurance. Few plant owners, however, have done a 100 percent job in this regard.

Sanitation controls are aimed at two objectives: (1) To keep contamination down to a minimum so as to avoid the development of off-quality during processing, storage, distribution and in the consumer's hands; (2) to keep the M.P.N. value for coliform organisms low so as to avoid the possibility of including pathogenic organisms and thus prevent illness where subsequent reheating of the product might not kill all pathogenic organisms.

While freezing causes some destruction of pathogenic bacteria, the process can also act as a preservative. For example, after 163 days at –20 deg. C., 25 percent of the E. coli were viable when brought back to optimum conditions.[2] Even in acid media, such as in sliced strawberries, McClesky and Christopher found the following survival at –18 deg. C.[3]:

E. typhosa...six mos. to one yr.
S. aureus.....six mos.
S. paratyphii.....not recovered
S. aertrychi.....one month
S. shottmulleri.....one month

Maximum standards tentatively recommended for manufacturers are an M.P.N. value of 100 per 100 g., and a total plate count of 100,000 bacteria per g. These standards appear lenient and should be considered as maximum. Three of the seven products analyzed in Table I would pass these standards. One sample meets the plate count test

(*Continued on page* 220)

Low temperatures must be maintained in the shipment of frozen cooked foods. If packages are permitted to defrost during normal handling, packages become moist and messy and upon refreezing quality is impaired and shelf-life reduced. Maxson Food Systems, Inc. prevents product defrosting by making shipments in refrigerated trucks.

High Melting Butter

Dehydrated butter, which keeps for long periods without refrigeration, made this bread spread possible for the Allied troops in the South Pacific. Its high melting point makes its continued manufacture practical, particularly for warm climates. Here is the process

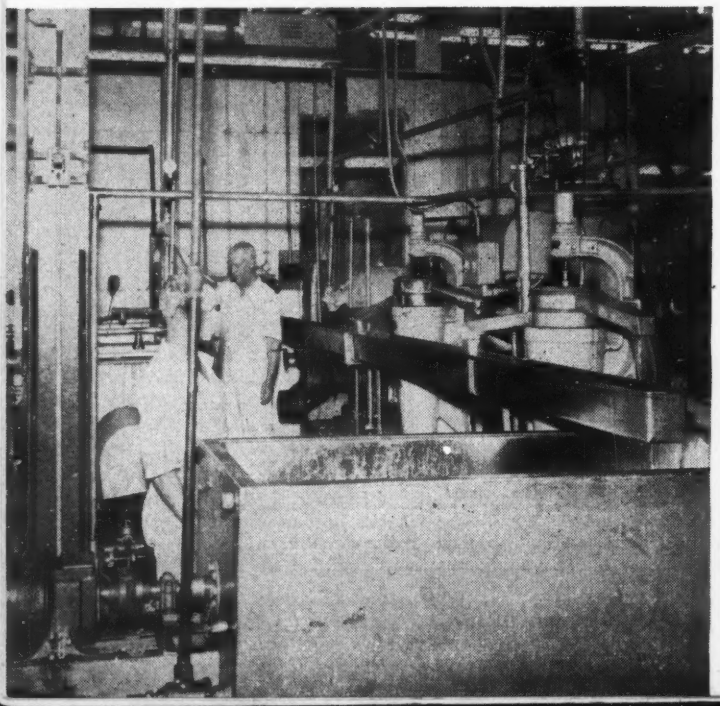
The butter to be treated comes in the form of 56 lb. cubes. Two melters are used, each consisting of ten compartments that will take two cubes. A central steam jet, of the can-raiser type, is placed below the perforated plate that forms a false bottom to each compartment. Direct wet steam melts the butter, which flows by gravity to the neutralizing vats. The butter temperature is not allowed to exceed 160 deg. F.

THESE pictures show the production of butter "concentrate" at the Queensland Butter Board's plant in Brisbane, Australia. The manufacture of dehydrated butter in the Antipodes has been modified in a number of ways since the development of the process by the Dairy Research Institute of New Zealand. The methods originally used were presented in the April, 1945, issue of FOOD INDUSTRIES.

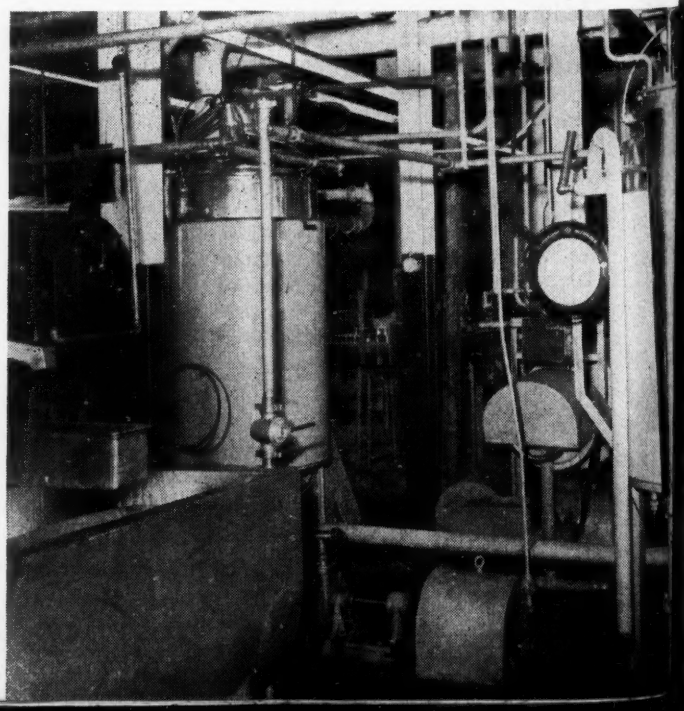
The product, as now manufactured, has a melting point of 105 deg. F. It consists of dry butterfat containing 3 percent hydrogenated peanut oil, 4 percent skim milk powder, and 2 percent finely ground salt, which has been treated with sodium carbonate. Diacetyl in proportions of 0.2 ppm. is added as flavoring. Samples have been held more than a year without deterioration. At room temperatures it is about as spreadable as butter and, while it gradually softens as the temperature rises it can be spread, rather than poured, at 105 deg. F. If produced with a melting point of 102 deg., the flavor is somewhat improved and there is an absence of the slight greasiness on the palate, which occurs with a melting point of 105 deg. F.

Nearly all equipment coming in contact with the fat is made of stainless steel. Pumps from the vacuum tanks are made of hard aluminum alloy. Plug-type valves are made of tinned brass. These valves or stopcocks are to be replaced with stainless steel shut-offs as soon as possible. Oxidation has been greatly reduced by strict control of air, copper, iron and free fatty acid content of the butter, together with the salt treatment.

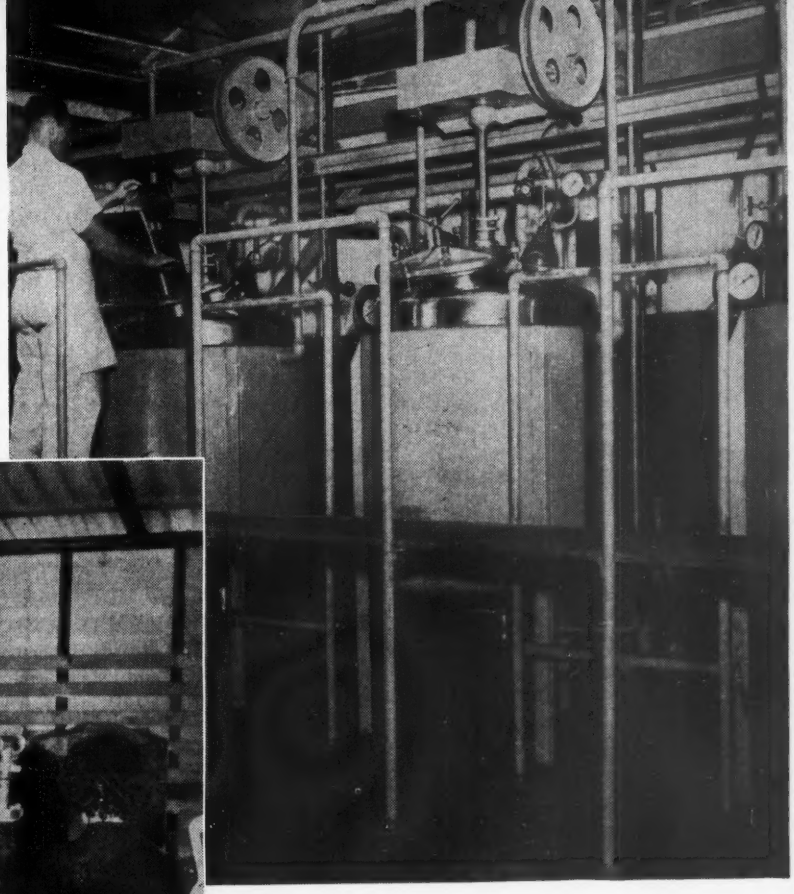
Two of the three neutralizing vats can be seen at rear left. Each has a capacity of 250 gal. and is fitted with an agitator. Here the serum is adjusted to about pH 10 by the addition of sodium hydroxide or sodium carbonate. This increases the efficiency of separation and reduces the free fatty acid content to a low figure. The molten "neutralized" butter is pumped from these vats to the centrifuges at the right, where the fat is separated from the butter serum. The serum is then passed through a cream separator to recover whatever fat may remain. Fat from the centrifuges flows into the tank and from there is sucked into the first dehydrator.

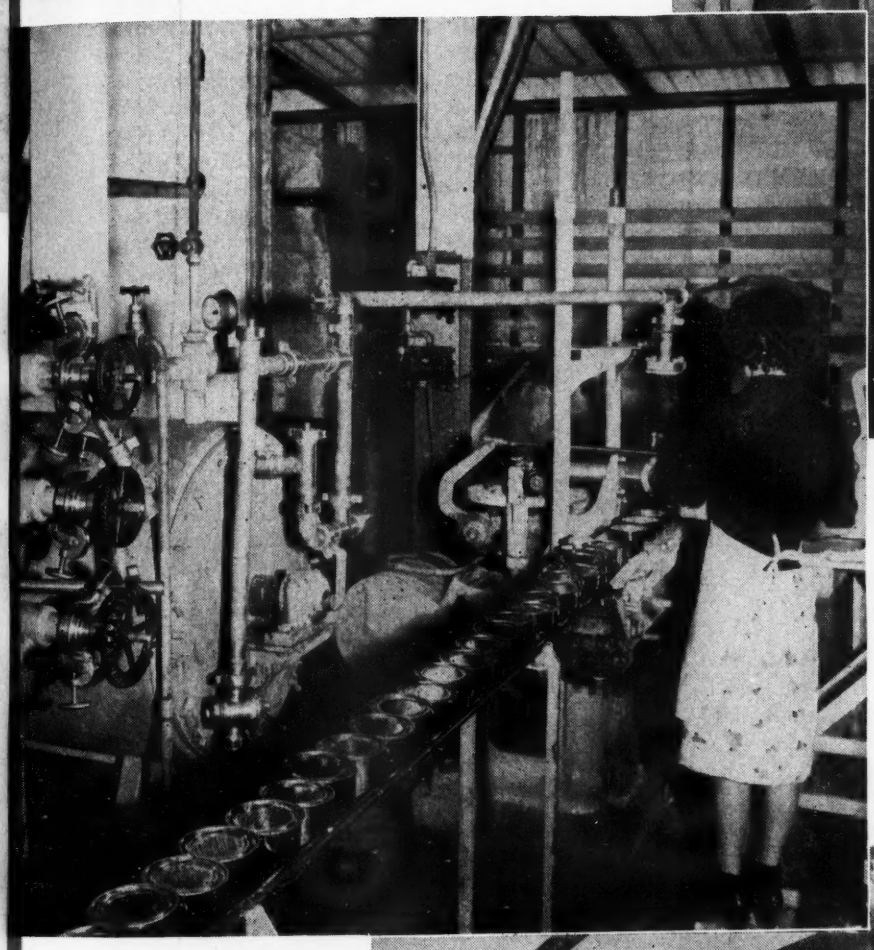


A vacuum of 29 in. is maintained in the first dehydrator, at right. The temperature is not allowed to rise above 160 deg. F. The butterfat sprays in at the top and the moisture content is reduced to below 0.2 percent. The dried fat is pumped into the clarifier, not seen, where the traces of curd and salt are removed. The now clear golden liquid is sucked into the second dehydrator, at left. A higher temperature can be maintained here, because of the absence of curd. The fat dries to 0.05 percent and is partially deaerated. From here the fat is pumped through the first cooler (not shown) and then to the vacuum mixing vats on the floor above.

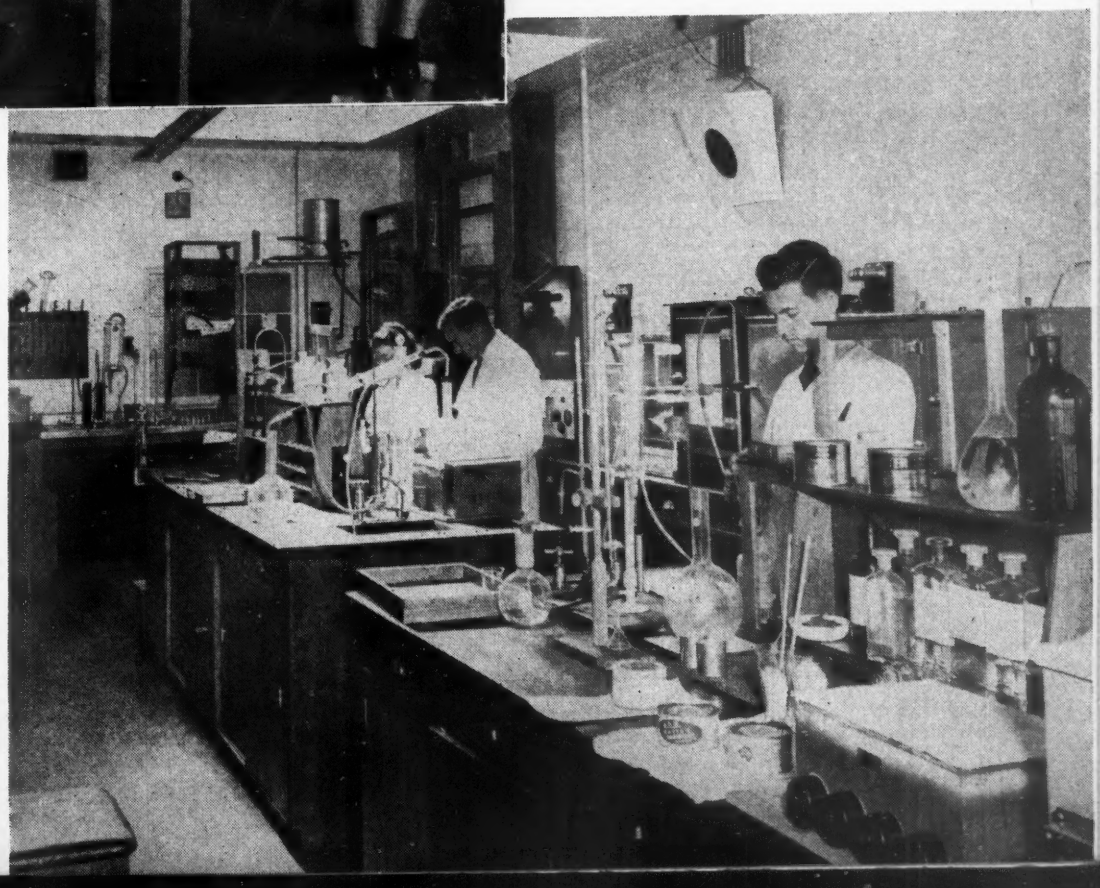


These vacuum mixing vats are fitted with propeller-type agitators. When a batch of about 1,000 lb. of butterfat has collected in the vat, the required materials are added, and the vacuum applied. Vigorous agitation is maintained at all stages from mixing to filling, in order to prevent settling out of the suspended solids from the molten fat phase. From here the mixture flows to the deaerator.





Below: Careful laboratory control is maintained in the manufacture of concentrated butter. Each 1,000 lb. batch is tested for moisture, salt, skim milk powder, free fatty acids, and air, in order to ensure that every stage is functioning correctly. Frequent determinations are made of copper and iron contents to guard against accidental contamination. Likewise all raw materials used are regularly analyzed.



From the deaerator, barely seen at extreme left, above, where a vacuum of 29 in. is maintained, the product is pumped to the second cooler, left center. The temperature of the mix is rapidly reduced from 140 deg. to 78 deg. F., at the rate of 40 lb. per minute. The rate of cooling and the agitation of the mixture are of vital importance at this stage in determining the texture of the finished product. The mixture, being supercooled, is fluid enough to flow directly to the filling machine, at end of conveyor. Vacuum closing machines at the forward end of conveyor (not shown) complete the process.

Freezer Trucks Hold Foods at Zero

Controlled temperature service is offered by Pacific Intermountain Express in either direction, between the West Coast and the Middle West, in straight truckload quantities

SHIPPERS of frozen foods and other perishables between California and Chicago, in either direction and in straight truckload quantities, are offered a motorized refrigerated service by the Pacific Intermountain Express. Any precooled cargo load can be maintained at controlled temperatures of plus or minus 2 deg. within a range of from zero to 70 deg. F. In the case of frozen foods, temperatures are maintained at or near the zero point accepted as necessary for the safe transportation of these products.

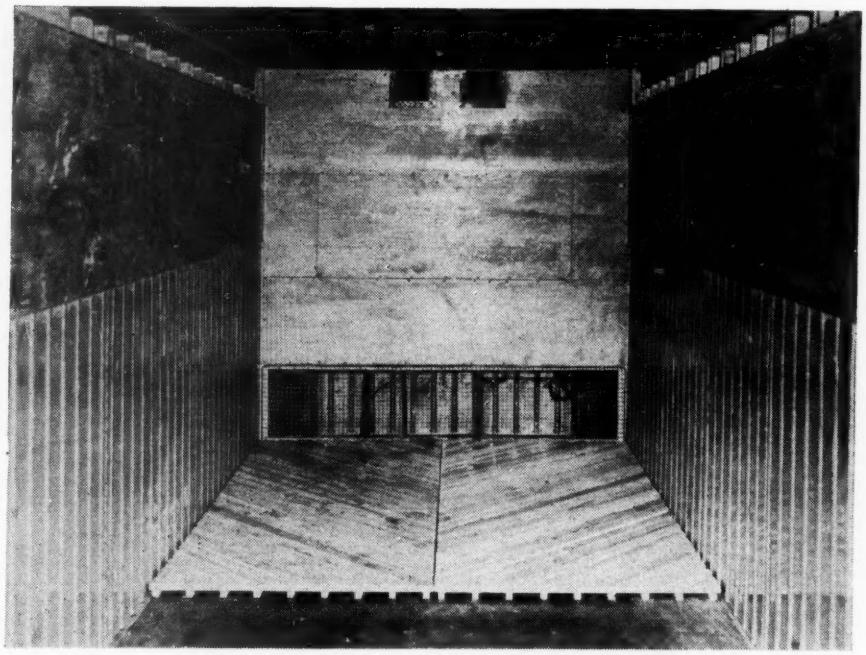
Improved System

This maintenance of the load at its precooled temperature is secured through the use of an improved refrigeration system. The load is surrounded by a blanket of circulating cold air, which intercepts the heat leaking through the insulation and carries it off before it contacts the cargo to raise its temperature. The system was developed from experience dating back to 1939 in the movement of frozen cherries across the desert from Utah to Los Angeles. On some of those runs it was 124 deg. in the sun, and during stops the outside temperature on the top of the trailer reached as high as 172 F.

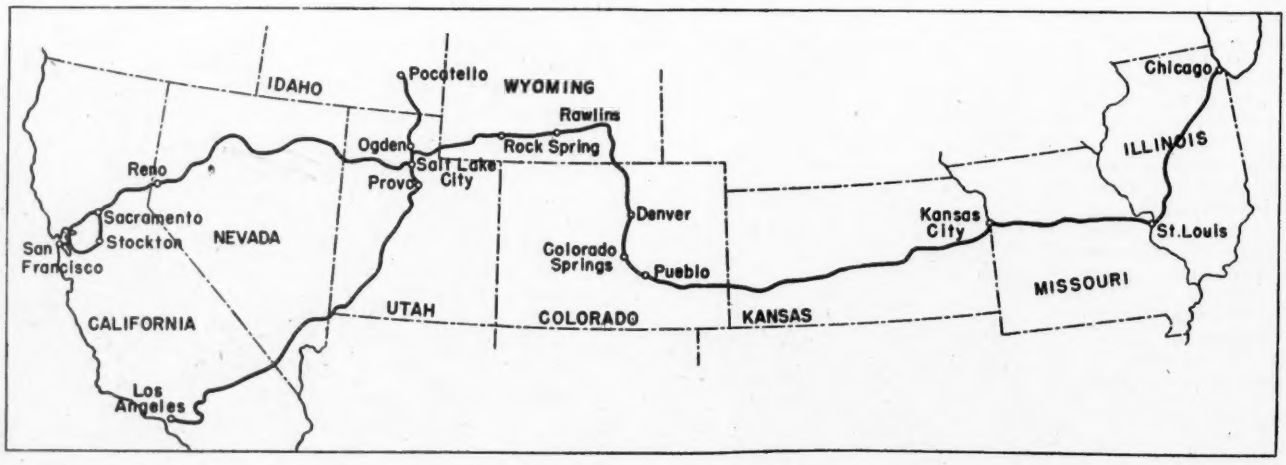
The desired temperature can be maintained whether the tractor-trailer is standing or moving. This is due to the fact that the refrigerating equipment is self contained on the trailer and is independent of the tractor engine or any other outside source of power.

Fleet Operation

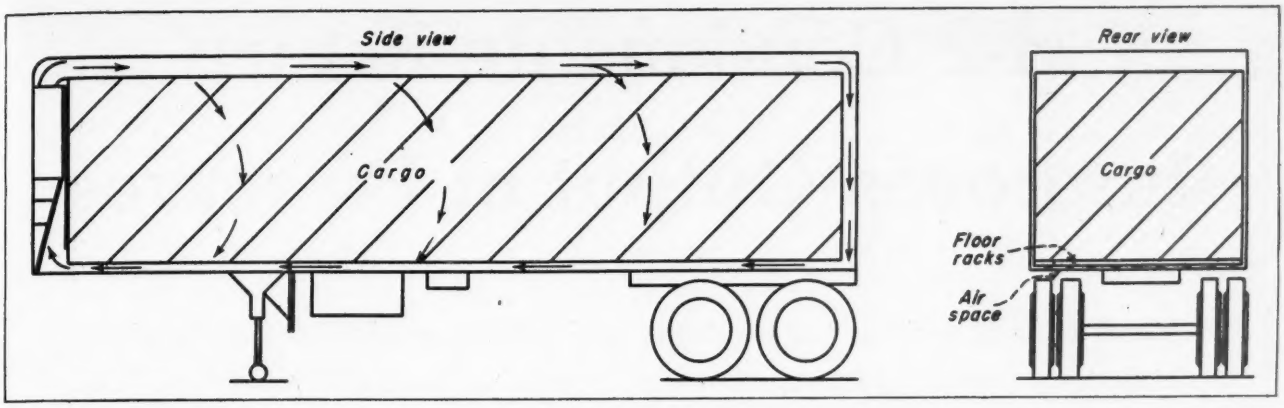
At the present time the P.I.E. is operating 15 refrigerated trailers with a maximum load capacity of 39,000 lb. and a net cargo space of from 1,351 to 1,441 cu.ft. between California, Denver and Kansas City. Due to differences in weight and size restrictions in the various states traversed, the maximum allowable loads between Kansas City and Chicago are 29,000 lbs., with a net cargo space of 1,351 cu.ft. By midsummer of 1947 ten additional trailers of the 29,000 lb. capacity will be operating between Kansas



Looking forward toward the nose of a P. I. E. trailer, cold air outlets can be seen at the top, and at the bottom, the warm air returns, which complete the cooling circulation.



This strip type map shows the pickup and delivery points as well as the routes used by the Pacific Intermountain Express in transporting frozen foods and other perishables from California to as far east as Kansas City, St. Louis and Chicago.



The blanket of circulating cold air, in which P. I. E. perishable loads are wrapped, is graphically illustrated in this diagram.

Temperatures for prefrozen foods can be maintained at or near zero, according to recent company tests.

City and Chicago. However, the maximum load of perishables that can be hauled from Los Angeles to Chicago, without drops prior to Kansas City, is 29,000 lbs.

For the protection of the shipper and to assure maintenance of the desired temperature between consigner and consignee, the P.I.E. does not accept shipments of frozen foods involving a connecting carrier at destination or origin. This policy will be maintained until refrigerated trucks and trailers with improved performance are more generally available.

Detail of Route

The accompanying map shows the routes over which the P.I.E. is prepared to handle frozen foods and other perishables. In greater detail, the points of origin or destination are: Los Angeles commercial zone; San Francisco and South San Francisco; Oakland; Alameda; Emeryville; Richmond; Berkeley; Sacramento; Stockton; Lodi; Tracy; Hayward; San Leandro; Reno; Salt Lake City; Ogden; Provo; Pocatello; Rock Springs; Rawlins; Denver; Colorado Springs; Pueblo; Kansas City (both Kansas and Missouri); St. Louis and Chicago, the eastern terminal.

The method by which the load in the P.I.E. trailers is wrapped in a blanket of circulating cold air is shown graphically in one of the accompanying illustrations. The load is placed on a solid floor rack with the supporting strips running longitudinally with air spaces between. Space is also left between the top of the load and the trailer ceiling. Vertical stripping is used on the sides of the load to provide side air spaces.

How It Works

In operation the cold air is forced over the top of the load from front to rear and down through the load to the bottom and thence back to the trailer nose along the floor. This provides a complete circulation of the air to give a uniform temperature throughout the load. The temperature of the cargo at destination is about the same, rear to front and top to bottom. This was verified on several test runs across the desert between Las Vegas and Barstow, when temperature readings taken at 30 locations in the loads of frozen food were almost constant.

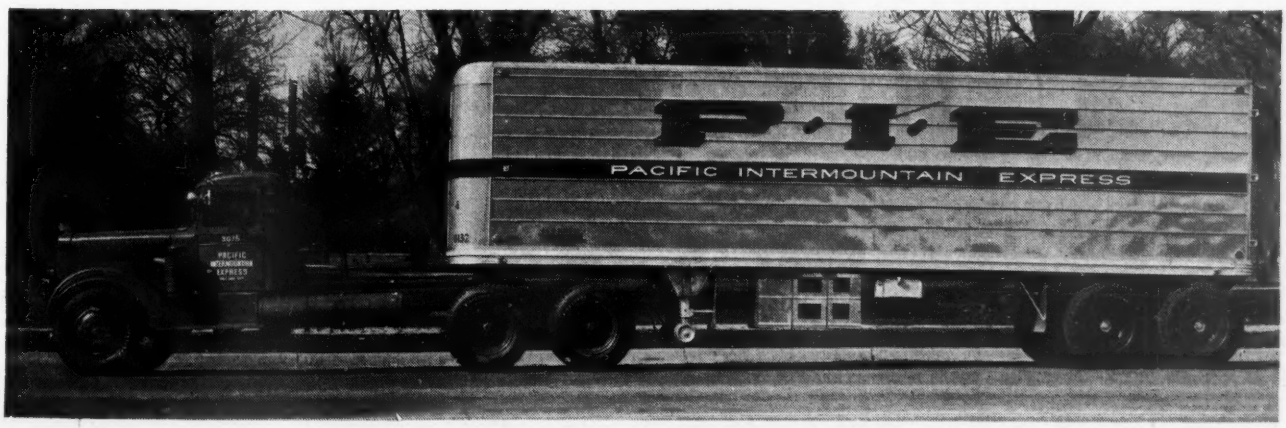
The P.I.E. complete refrigerating mechanism weighs 1,373 lb. It consists of two assemblies, the power condensing unit, located outside under the trailer floor, and the evaporator-blower unit, mounted inside the nose of the trailer.

Electric blowers induce circulation with an air velocity of 4,400 cu.ft. per minute at the outlets. The cold air travels from front to rear at the top of the load and the warmer air from rear to front at the bottom.

The power unit consists of a four-cylinder, air-cooled gasoline engine driving the refrigerant compressor through a centrifugal clutch. This permits the engine to idle at about 900 r.p.m. without driving the compressor, but at 1,200 r.p.m. engages the compressor and drives it up to a governed speed of 1,750 r.p.m.

Thermostat Used

Thus the refrigeration is controlled by regulating the engine speed. This is done by a thermostat responsive to a temperature-sensitive bulb located in the warm air return under the evaporator coils inside the trailer nose.



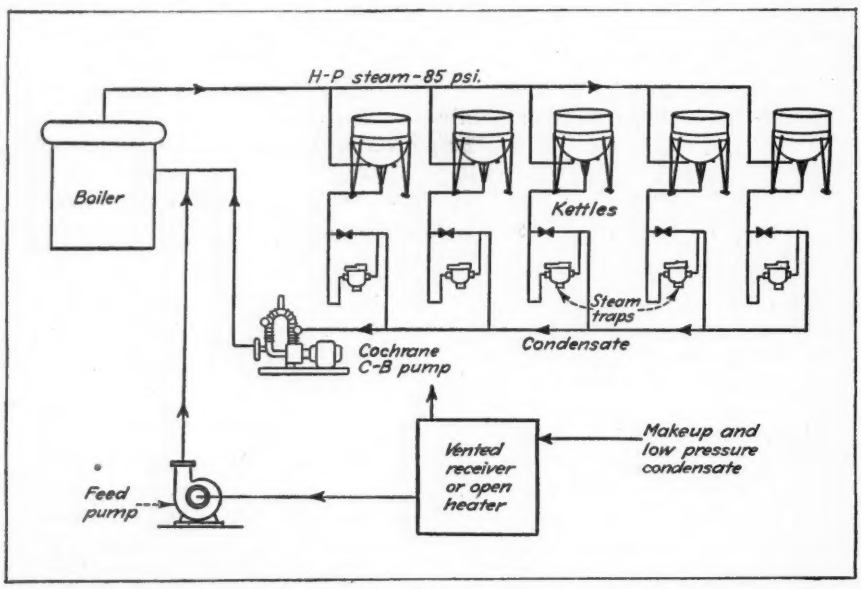
The 34 ft. semi-trailer, shown here, which with its tractor measures 51 ft., is used west of Denver. East of that city limitations of 45 ft. overall, and 32 ft. trailers, make it necessary to transfer the perishable load to smaller units.

H-P Condensate Return Improves Output of Preserves

More uniform cooking temperatures and greater production resulted from high temperature condensate return system at Colonial Preserves. Fuel savings were large when condensate returned to boiler at 250-300 deg. F.

COOKING time of orange marmalade has been reduced 40 percent in the plant of Colonial Preserves, Buffalo, New York, by the installation of a high pressure condensate return system. Other advantages resulting from this installation are more uniform heating of the products and a definite saving in fuel.

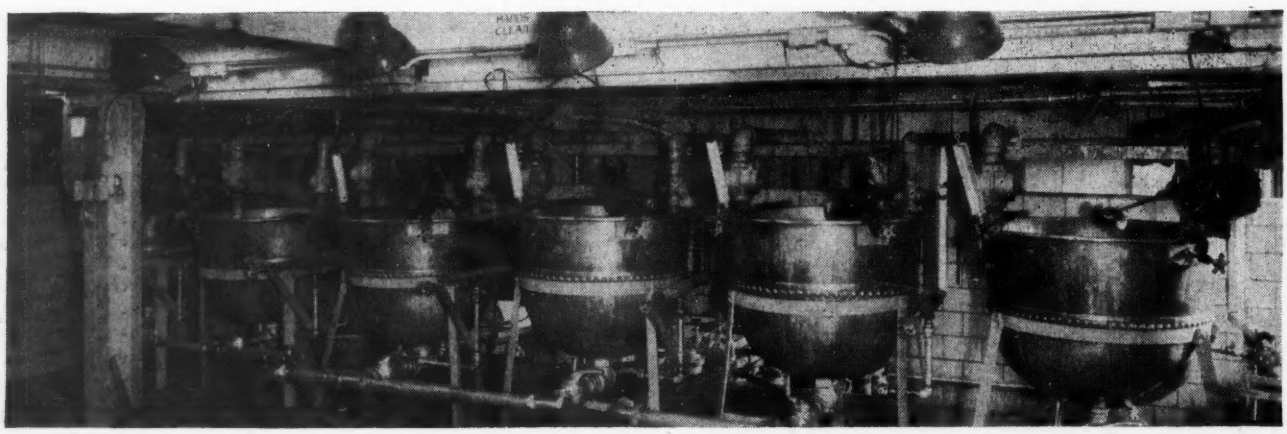
In 1945 the plant of Colonial Preserves was moved from a building where steam was purchased to a new location equipped with an automatic oil-fired boiler. At that time a Cochrane C-B high pressure condensate return system, with a trap for each of the five cooking kettles, was installed. This was done to eliminate the loss of heat from steam in an open system, and to insure prompt venting of air from the kettles. As the operations are not continuous, venting is extremely important, since the air must be removed from each kettle for each batch. Traps are of ample size for condensation and air. A by-pass was provided around each trap, with shut-off and needle valves for additional venting. However, there has been no need for venting.



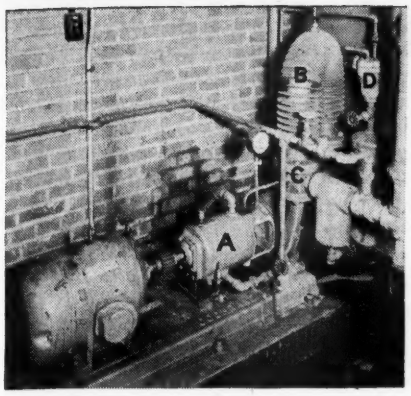
Flow sheet of high pressure condensate return system used at Colonial Preserves. Condensate from the jacketed cooking kettles is drawn to C-B pump where entrained air is eliminated and condensate returned to the boiler at 250-300 degrees F.

Improved Production

Uniform cooking temperatures are now obtained on all of the jacketed kettles. The time of cooking has been materially reduced; as an example, the cooking of orange marmalade which formerly took 20 minutes has been reduced to 12 minutes. This resulted in an increase in the number of batches



Jacketed kettles used to cook jams, jellies, preserves and marmalades at the Buffalo, N. Y., plant of Colonial Preserves. Time per batch has been reduced by 40 percent since the installation of a high pressure condensate return system.



High pressure return system. Note special centrifugal pump A, thermo-fin priming loop B, jet pump C and air separator D.

processed per day per kettle. There has been a material saving in fuel due to the elimination of flash steam. Since all of the condensate is returned to the boiler, a minimum of make-up water is required, resulting in less feed water treatment and less scale formation.

Boiler pressure is kept at 85 psi. The C-B inlet pressure is quite variable; at times being as high as 30 psi., and at other times as low as 5 to 10 psi., averaging about 20 psi. The discharge pressure runs from 110 to 112 psi. When only two kettles are in use, the temperature of the condensate removed from the kettles is about 250 deg. F. When all five kettles are in use, however, the temperature rises to 300 deg.

Operation of System

Air and condensate return directly from the cooking kettles to the inlet of a specially designed centrifugal pump; in the discharge line the air is separated from the condensate, the air is vented automatically, and the condensate returned to the boiler. The return system is provided with a loop, so arranged that the pump is always primed. The discharge from the pump is through a nozzle in a jet pump, the condensate and air entering a side tapping in the jet chamber where they are drawn into the mixing tube, and then into the loop.

When there is no condensate, the jet pump reduces the pressure on the return line to remove air; when condensate is present, it is drawn into the chamber and loop. As the loop is always full of water, whenever condensate enters an equal quantity of water is discharged into the boiler. The pump requires no receiver, float switch or automatic control; it is necessary only to start it at the beginning of the day and stop it at the end.

Heating Plant Check-ups

The end of the winter heating season is the best time to get the boiler plant and heating equipment in shape

By ERNEST W. FAIR, Bristow, Oklahoma

HERE are a number of end-of-season suggestions on steps to be taken in setting one's heating equipment in order for next winter.

1. The furnace should be thoroughly cleaned to remove all dirt, soot and scale from flues and firebox surfaces. All unburned fuel and ashes must be removed.

2. Make certain the cleaning job is all inclusive. See that no part of the equipment is overlooked.

3. Do not use soda or any other alkalies or acids for this cleaning.

4. All coal should be removed from the stokers.

5. There are a number of good methods of applying a moisture repellent to the surfaces after the cleaning job has been done. One of the least expensive and most effective methods is to spray them with automobile crank-case oil.

6. The operation of blowers, and the motors which run them, should be checked thoroughly. If it has been a particularly long season it may be advisable to have the motors checked in an electric motor shop. Next winter will be no time to discover that the motor on a blower or circulator has gone bad.

7. Use lubricating oil liberally —be sure to oil all door hinges. Check valves closely, and wherever within the heating unit or its distribution set-up a wheel turns or an axle moves, give that spot oil.

8. Warped, broken or worn-out grates should be replaced.

9. All valves in steam distribution systems should be completely disassembled and checked for needed repairs. Make certain they are properly oiled upon reassembly.

10. On such systems, it is a wise policy to drain and flush the entire system to prevent moisture collection at elbows and in low spots.

11. Drain and purge the air from all radiators, whether steam or hot water. All radiator valves should be checked closely. Make certain the radiator coil itself will have free circulation when it is needed.

12. If a paint job is needed do not hesitate to have it done. Let a fresh coat of rust-proof paint take care of this idle equipment during the summer months.

13. Fix a definite responsibility for the whole maintenance operation. Typewrite a list of points to be checked showing exactly where each is located in the plant. Have the maintenance man use this check list, and make him sign responsibility that every point has been thoroughly taken care of.

14. Thermostats should be checked at least once a year. If the plant maintenance man is not thoroughly familiar with the type used call in someone who is. Good maintenance of thermostats is insurance of performance next fall and winter.

15. Check each thermostat location once again; the past season's operations may have shown that some have been improperly placed. Thermostats should always be located where there is sufficient air circulation to reflect the actual temperature changes in the area.

16. A detailed examination should be made of all piping, radiator vents and traps.

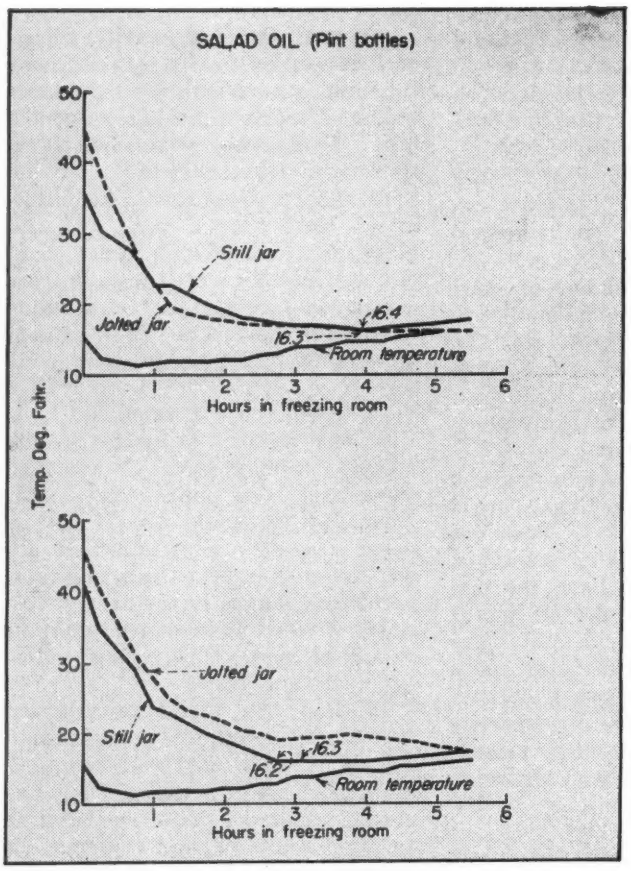
17. Has the boiler or furnace been large enough to do an adequate job during the past cold months? If experience of the period has shown otherwise, now is the time to start planning for enlargement or replacement of the present unit. Deliveries will take from three to four months in most localities, and that will be barely in time.

18. Have plant conditions around the stoker, if one is used, been dry and clean, and has the unit been well lubricated and free from rust? If a change is in order this should be done at the earliest possible moment.

19. If heating units are located in the basement run a thorough check to make sure water seepage has not started in that basement. If such conditions have arisen they should be permanently stopped if it is possible to do so; a temporary check only postpones the inevitable.

Changes in Fats and Oils During Freezing and Thawing

Margarine and shortening solidified at freezing temperatures, salad oil clouded, mayonnaise and salad dressing thickened and the oils separated. These conditions disappeared when normal temperatures were again reached



Salad Oil

Test Number	Freezing room temp. range	Commodity starting temp.	Time to reach freezing point (hr.)	Undercooling (hr.)	Undercooling (deg.)	Total time to freeze (hr.)	Freezing point
Pint size bottles:							
1-Still	11.3 to 16.2	35.8	3½	¾	0.2	4¼	16.4
1-Jolted*	11.3 to 16.2	44.8	...	...	...	...	...
2-Still	11.3 to 16.2	41.0	2¾	½	0.1	3¼	16.3
2-Jolted*	11.3 to 16.2	45.5	...	...	...	...	...

Freezing temperature range, 16.3° to 16.4° F.; average 16.4° F.
*Did not undercool.

Freezing temperature does not affect the characteristics of salad oil except to make it cloudy and semi-solid. These conditions rapidly disappear when the oil reaches normal temperatures.

DATA are now available on the freezing points of mayonnaise, salad dressing and salad oil, which will aid storage and shipment in cold weather. The data are the outcome of an investigation of a variety of food products conducted at the experimental cold storage laboratory of the Plant Industry Station, U. S. Department of Agriculture, Beltsville, Md.

In these tests, lard, shortening and oleomargarine showed smooth cooling curves, no undercooling and no evidence that the products froze. If these fats have true freezing points, there was no indication, even when the products were held three to five hours at –1 deg. F. to –5 deg. F.

Oleomargarine and Shortening

The tests indicate that oleomargarine is not affected by low temperatures except for temporary solidification. This temporary condition may be attributed to the lack of a definite break (due to cooling or freezing) in the temperature curves.

Upon subjecting shortenings and lards to freezing temperatures, the fats also solidified or hardened. This condition disappeared when shortenings and lards reached normal temperatures. Some of the samples were placed on a jolting machine for the tests, simulating the motion of a railroad car. Other samples were left undisturbed. No difference, however, could be detected in the condition of still and jolted samples during freezing.

Freezing temperatures have no effect on the cake baking quality of shortenings, provided they are reconditioned to a uniform temperature before baking

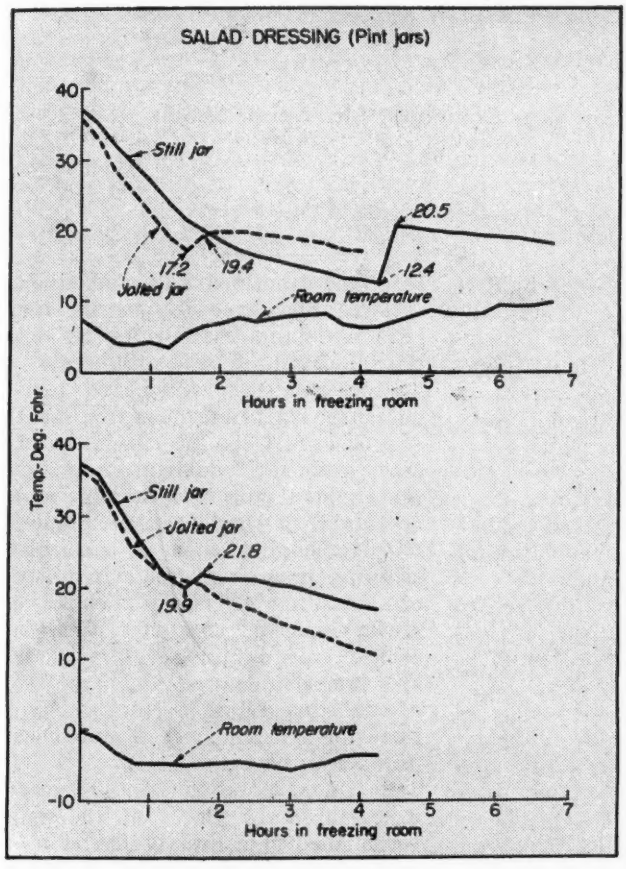
Acknowledgments

This investigation of the freezing of fats, oils and their products is part of a large cooperative government agency project. The work was commenced during the war in view of transportation emergencies which often resulted in the exposure of packaged foods to abnormally low temperatures. The findings have direct peacetime application, since it was found that goods in shipment can withstand low temperatures for short periods, without damage. Cooling and freezing curves on canned and bottled goods have been published in Food Industries in the past year.

Those primarily responsible for this investigation on fats and oils are D. H. Rose, senior physiologist, Division of Fruit and Vegetable Crops and Diseases, U. S. Department of Agriculture; H. D. Johnson, transportation specialist, Transportation, Rates and Services Division, Office of Distribution, War Food Administration; and H. B. Dixon, grain technologist, Grain Branch, Production and Marketing Administration, U. S. Department of Agriculture.

and that proper baking procedure is followed.

Salad dressing and mayonnaise thickened, jelled and in some instances the emulsions separated when in the cold state. In larger quantities, such as commercial size cartons with a dozen or two dozen jars, the rate of cooling or warming up after cooling would be slower. In larger size packages much of the product would remain frozen longer than those in smaller packages. Consequently, harmful effects caused by freezing would be greater. Reconditioning of larger size packages, if commercially possible, would be more difficult than applying the same treatment to all consumer size jars of mayonnaise.



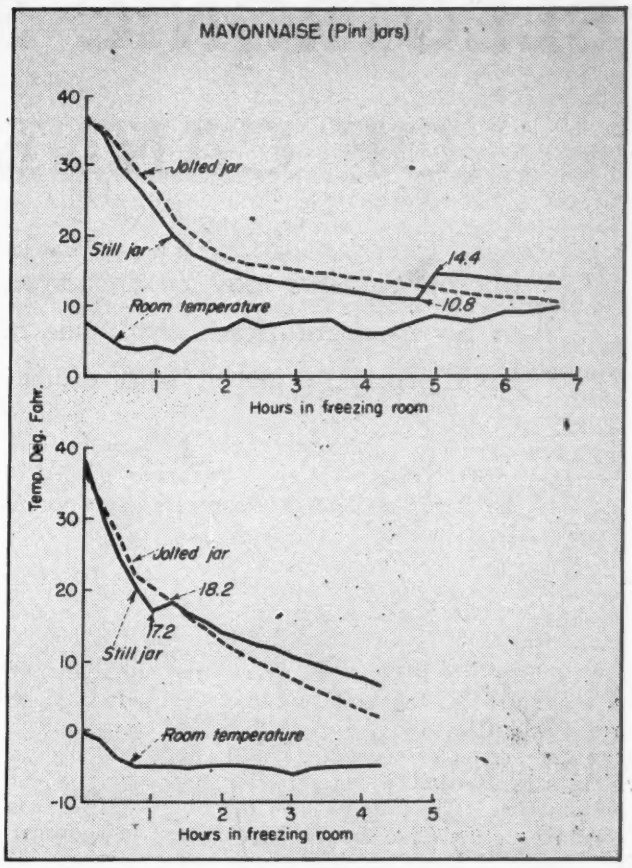
Salad Dressing

Test Number	Freezing room temp. range	Commodity starting temp.	Time to reach freezing point (hr.)	Undercooling (hr.)	Undercooling (deg.)	Total time to freeze (hr.)	Freezing point
Pint size jars:							
1-Still	3.4 to 8.1	37.3	1½	3	8.1	4½	20.5
1-Jolted ..	3.4 to 7.5	36.0	1¼	½	2.2	1¾	19.4
2-Still	−5.2 to −0.2	37.4	1¼	½	1.9	1¾	21.8
2-Jolted* .	−5.2 to −0.2	36.5	...	...	...	...	...

Freezing temperature range, 19.4°F. to 21.8°F.; average, 20.6°F.

*Did not undercool.

Salad dressing emulsions tend to thicken and jell when in the cold state. These changes are generally accompanied by oil separation. Temperature curves for the freezing period do not necessarily indicate a change in the quality of salad dressing subjected to freezing temperatures except for the tendency of the dressing to thicken. In general, salad dressing may not be permanently impaired by freezing provided the emulsions can be stirred to normal consistency after freezing.



Mayonnaise

Test Number	Freezing room temp. range	Commodity starting temp.	Time to reach freezing point (hr.)	Undercooling (hr.)	Undercooling (deg.)	Total time to freeze (hr.)	Freezing point
Pint size jars:							
1-Still	3.4 to 8.1	36.9	1¾	2¼	7.7	4	21.2
2-Still	3.4 to 8.6	36.7	2¼	2¾	3.6	5	14.4
3-Jolted* .	3.4 to 8.6	36.0	...	...	...	...	...
4-Still	−5.0 to −0.2	38.6	1	¼	1.0	1¼	18.2
5-Jolted* .	−5.0 to −0.2	36.7	...	...	...	...	...
6-Still	3.4 to 7.8	37.7	2	1	3.4	3	16.7

Freezing temperature range, 14.4°F. to 21.2°F.; average, 17.6°F.

*Did not undercool.

Mayonnaise emulsions tend to thicken and jell in the cold state. These changes are generally accompanied by oil separation. Emulsions in some samples broke down partially and completely. A jolted sample was affected more than a still sample because its emulsion could not be reformed. Partial and complete separations are not indicated by any undercooling break in the temperature curves. With several exceptions, the quality of mayonnaise may not be permanently impaired by freezing provided emulsions can be stirred to a normal consistency after freezing.

Brands Listed

Various fats, oils and their products in 1-lb. cartons or glass jars, pint jars and pint bottles were furnished for the tests by Armour and Company, Chicago, Ill.; Best Foods, Inc., New York, N. Y.; Capital City Products Company, Columbus, Ohio; Durkees Famous Foods Company, Cleveland, Ohio; J. H. Filbert Company, Baltimore, Md.; John F. Jelke Company, Chicago, Ill.; Kraft Foods Company, Chicago, Ill.; Jewett and Sherman Company, Milwaukee, Wis.; Wm. Schluderburg and T. J. Kurdle Company, Baltimore, Md.; Southern Cotton Oil Company, Savannah, Ga.; Swift and Company, Chicago, Ill.; and Wilson Company, Chicago, Ill.

ELECTRONIC STERILIZATION OF CANNED FOODS?

Microorganisms may be destroyed by lethal effect of H. F. radiation, or by electronic heat. Problems of localized overheating, heat losses from product exterior and quick cooling after sterilization remain

By J. M. JACKSON, Research Division, American Can Company, Maywood, Illinois

A SUCCESSFUL industrial process must be substantiated by careful scientific study, and at the same time have an economic basis which will eventually satisfy the profit motive. The possible use of electronic methods for the sterilization of canned foods should be considered in the light of these two criteria.

In order to avoid any misunderstanding, the sterilization of canned foods may be defined as a treatment which will permit long storage of foods of high moisture content, in sealed containers at ordinary room temperature, without spoilage caused by microorganisms or enzymes. The term "commercial sterilization" is used in the industry and indicates that all microorganisms in the foods have been killed, except a few types of organisms which do not grow under ordinary storage conditions. In the case of vegetable and meat products all food spoilage microorganism, except a few of the thermophilic bacteria, must be killed and enzymes must be inactivated. Growth of some microorganisms is inhibited in fruits by fruit acids or by high sugar concentrations, so that commercial sterility may be achieved readily in acid products by processing in boiling water. The sterilization of non-acid canned foods by established methods requires a considerable length of heat treatment at temperatures in the range of 240 to 260 deg. F. Such treatment is necessary to destroy heat resistant spores of spoilage bacteria including *Cl. botulinum*, which produces a lethal toxin.

The problem of sterilization is not one that may be treated lightly. Not only is there danger of substantial economic losses from inadequate sterilization of canned foods, but there is a potential hazard of loss of life from botulism poisoning. The several deaths which occur every year, in various localities throughout the United States, from improperly sterilized home canned foods are irrefutable evidence of this hazard. The commercial canning industry has had a fine record of freedom from botulism for over 20 years, and this record must be maintained.

Dehydrated products are, of course, in an entirely different class since their low moisture content inhibits the growth of spoilage microorganisms. Destruction of insect forms of life in certain dry products is sometimes called "sterilization," but comprises an entirely different problem from the sterilization of canned foods. Blanching raw foods and defrosting frozen foods are also relatively simple processes in which electronics may find ready application.

Two Approaches

There are two basic approaches to the sterilization of canned foods by electronic means:

1. The microorganisms might be destroyed by some lethal effect of an electronically produced radiation without the aid of heat. Radio frequency electromagnetic radiation, ultraviolet rays, X-rays and cathode rays are possible types of radiations for such treatment. Enzyme inactivation might also be accomplished by the irradiation or it might be achieved by low temperature heat treatment; it would then only be necessary to destroy the heat resistant microorganisms by the irradiation of the product.

Since the relatively high temperature, long time heat treatment required for the sterilization of many canned foods has an important influence on their quality and acceptability, the idea of sterilizing with little or no heat is most intriguing in view of the possibility of obtaining preserved foods of fresh, uncooked characteristics, or cooked only as for serving. It is also conceivable that the quantity of radiation might be small enough to permit reasonable costs on a mass production basis.

2. On the other hand, dependence might be placed on the well established heat destruction of microorganisms and enzymes by using electronic radiation (radio frequency power) to produce the heat. The achievement of a uniform and rapid temperature rise throughout the product would permit sterilization without the overcooking of the outer portions of the product, which is inevitable when packaged solid or semi-solid products are heated by conventional methods in steam retorts. This might carry the industry a long way toward the goal of freshly harvested or freshly cooked quality preserved foods, but would be limited by the necessarily slow cooling cycle which would follow the electronic heating cycle.

The operating cost of this procedure is relatively easy to analyze, since the quantity of heat required to bring the canned products to a temperature which would achieve rapid sterilization and the costs of

r.f. power are well established. Cost of r.f. power, including tube cost, approximates 12 times steam cost. The cost of steam for sterilizing, however, is very low, and the r.f. power cost could be met by a premium of a few cents per case of canned goods. The cost of equipment is harder to estimate. Amortization figures for generating equipment appearing in the literature are not unreasonably high, but are presumably based on year around operation rather than the short packing period for seasonal products. Furthermore, the cost of the auxiliary equipment required to apply the power to the product is unknown, but undoubtedly would be substantial. The total investment for this heating equipment might easily approach the entire cost of a conventional cannery.

Lethality of Radiations

The literature contains some evidence of the killing of microorganisms by radio frequency radiation without apparent aid of heat.[1,2,3] There seems to be no conclusive evidence, however, of the complete sterilization of heat resistant spores of food spoilage bacteria. Fleming[1] indicates that 100 percent kill of *E. coli* was obtained only in a salt free medium (1 min. irradiation at 28 megacycles and 10 watts), and that the addition of only a few hundredths of one percent of sodium chloride reduced the degree of kill considerably. Thus, it is apparent that the concentration of electrolytes present in food products would adversely affect any lethal action of radio waves.

Experiments, previously reported by Benjamin and Ecklund of this laboratory,[4] showed no reduction in counts of thermophilic flat sour spores when suspensions of the spores, in dilute neutral phosphate solution, were exposed to a 10 megacycle frequency electromagnetic field for 10 min. Obviously this work is not conclusive and may not be indicative of effects at ultra high and super high frequencies, but it does indicate that spores are more difficult to kill than vegetative cells such as *E. coli*.

The literature also indicates bactericidal effects from other types of radiation, such as radioactive emanations, X-rays and cathode rays. It is natural to expect that such radiations may be more effective than radio frequency electromagnetic radiation. Nevertheless, no published work has been found giving conclusive evidence of complete sterilization of resistant spores of spoilage microorganisms, which would be necessary for the sterilization of canned foods.

Enzyme Inactivation

Successful food preservation would also require inactivation of enzymes and assurance that the irradiation did not cause the formation of deleterious or toxic substances in the food. The magnitude and diversity of the problems involved would make it appear that studies on preservation of food by irradiation without heat are still largely in the realm of pure science and may best be handled by academic institutions.

Research

It is interesting to note that a portion of the work of the Department of Food Technology at Massachusetts Institute of Technology is being sponsored by a number of food industry concerns. Equipment and personnel for studying the effects on spoilage organisms of X-rays and cathode rays of more than a million volts potential are available. Early unpublished results give some promise of success, but the project is certainly one requiring long range study.

A Food Research Institute has been organized at the University of Chicago in association with the new Institutes of Nuclear Studies, Metals, and Radiobiology and Biophysics. In view of the long outstanding records of these two institutions, we may expect that exhaustive studies will be conducted on the role of various types of radiations in the food industry.

It would seem wise for industry to await the outcome of studies at institutions of this character before deciding whether radiations without heat have definite possibilities for the sterilization of canned foods.

Radio Frequency Heating

The theories of induction heating of materials of low electrical resistivity, and dielectric heating of materials of high resistivity, by the application of high frequency power are well known.[10,11,12,13] Kinn[10] classifies foods according to their resistivity, indicating that many ready-to-serve foods of moderate salt content may not be well suited to dielectric heating. A third type of heating is resistance heating, obtained by direct application of electric power to materials of moderate electrical resistance, such as food products containing approximately 1 percent salt.

Requirements

Assuming that a method of electronic heating is available, the requirements for successful use in the heat sterilization of canned foods may be listed as follows:

1. Heating must be fairly uniform throughout the product. Arcing or localized overheating must

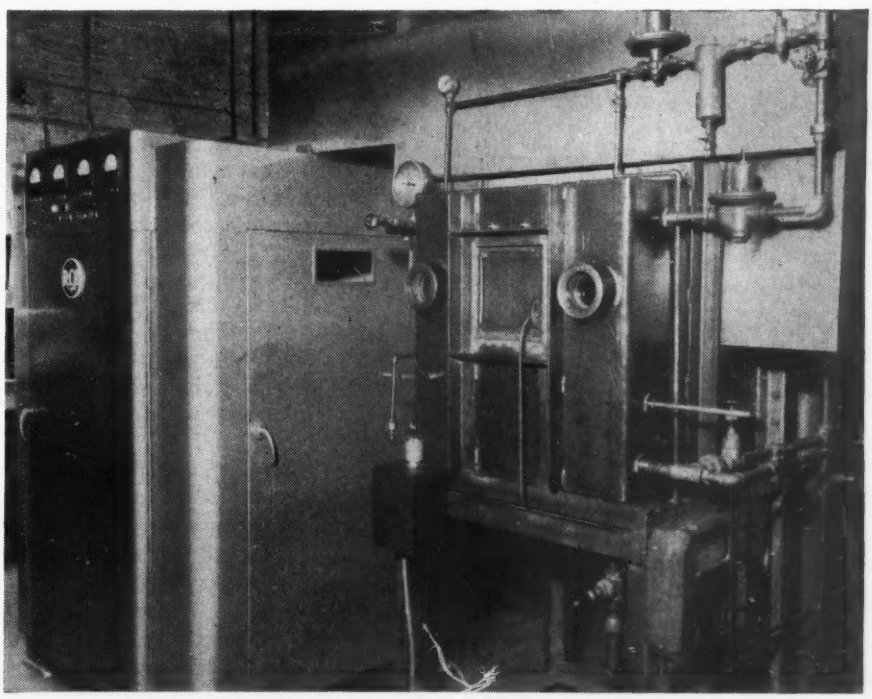


Fig. 1. Apparatus used for sterilization of canned foods by electronic heat consisting of a 15 kw., 10 megacycle radio frequency generator and a copper-lined sterilization chamber.

be avoided in order to insure freedom from scorched or other "off flavors." This condition must be met in spite of the fact that many foods are not homogeneous; e.g., meats have both lean and fat portions. Difficulty may also be anticipated from cooling of the external portion of the product by loss of heat to the surroundings.

2. Rate of heating must be sufficiently rapid to reach a temperature of approximately 250 deg. F. within a few minutes, in order to effect sterilization with a significant improvement in quality, and in order to permit high speed production with equipment of practical size.

3. Equipment for applying the power to the product must be constructed in a manner to permit treatment of the product at pressures considerably above one atmosphere—corresponding to the vapor pressure of water at the maximum temperature attained in the product.

4. In order to maintain the sterility obtained during the heat treatment, the product must be heated and cooled in sealed containers, or it must be transferred and sealed aseptically into presterilized containers after the sterilizing heat treatment.

5. Since the operating and equipment cost will necessarily be many times that for heat sterilizing by means of steam, it is obvious that efficiency must be high, and equipment design as economical as possible, in order to make costs competitive with fresh or frozen foods as well as foods processed by other means. A cannery producing No. 2 cans of a hot filled product at a rate of 200 cans per min. will require approximately 1½ million B.t.u.'s per hr. to sterilize the product, assuming no heat loss. This would require a r.f. generator of approximately 500 kw. output; figures in the literature[14] indicate a cost of the order of $200,000 for such a generator alone.

Experimental Work

Portions of a previous report on studies carried out in this laboratory[4] are quoted, not as representing the ultimate in application of r.f. heating to the sterilization of canned foods, but as an illustration of an attempt to meet some of the above requirements on a laboratory scale.

"For this investigation, a 15 kw. output, 10 megacycle, radio frequency generator was used as a power source, see Fig. 1. Connected to the generator were a pair of applicator plates, see Fig. 2, between which the food container was placed for heating. These plates were located in a copper lined cubical steel pressure chamber about 26 in. on a side, the electrical leads entering the chamber through glass bowl insulators. The high tension lead connection from the generator to the applicator was contained in a steel shield. A strip of copper about 4 in. wide was located along the inside top surface of the shield to reduce electrical losses and to serve as the ground. An adjustable inductance in this transmission line permitted matching the load to the generator.

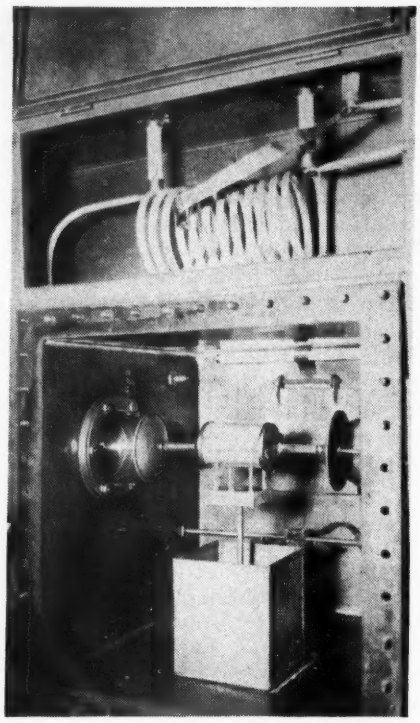


Fig. 2. Interior of sterilization chamber showing food container between applicator plates, water tank and glass insulators.

"Pressure as high as 45 lb. per sq. in. could be maintained inside the pressure chamber in order that a food product in a sealed container could be heated to about 250 deg. F. without undue strain on the container.

"An adjustable support in the chamber permitted lowering the container away from the applicator plates into a tank of water for further heating or cooling following electrical heating. Before entering the tank, the water first passed through a heat exchanger, so that any desired water temperature could be obtained. An automatic drain valve in the pressure chamber prevented the water from filling the chamber.

Operations

"Heating tests can be divided into two groups, according to the method of applying the radio frequency energy to the food. In the first series of tests, the energy was applied to the sides of a 500 ml. tall form Pyrex beaker by means of shaped electrodes located on opposite sides of the beaker. Because of the difficulties encountered and the slow rate of heating obtained, no samples were prepared by this method.

"In the second series of tests sterile samples of pea puree (inoculated), luncheon meat and Vienna sausage were prepared by electrical heating in a container consisting of a 90 mm. diameter Pyrex tube fitted with two metal ends. The metal ends of the container acted as electrodes and were in actual contact with the food to be heated. A container of this type is described by Bohart.[15] Heating times varied from 0.5 to 5.0 min. After electrical heating, the container was lowered into a tank of hot water and held at a temperature of 250 to 255 deg. F. for a long enough period, usually about five min., to complete the sterilization of the product and to sterilize the walls of the container. This was necessary because the glass container received heat only by conduction from the product, and consequently the inner walls of the container were much cooler than the product at the center of the container. The container was then cooled.

"Although radio frequency energy was used to heat this container in most tests, a few tests were conducted in which ordinary 110 volt, 60 cycle current was applied. Since the product was heated almost as rapidly by 60 cycle current, the product must not have been dielectric in nature and heating must have been largely by resistance. Rather severe corrosion of the metal ends resulted from the 60 cycle heating. (Low frequency current would, of course, not be effective in heating through the sides of a glass container.)

Results

"Some improvement in flavor and texture was noted in the luncheon meat and Vienna sausage, electrically processed. However, the numerous limitations of electronic heating in the double ended con-

(*Continued on page* 224)

EDITORIALS

LAURENCE V. BURTON, Editor

How Gorton-Pew Does It

EVERY time you go into Gorton-Pew Fisheries Company's main office at Gloucester, Mass., you see a sign that makes you feel good. The sign has been there for years and years. It reads—

To Traveling Salesmen:

If there is anything we can do to make your path easier or your way brighter, please tell us and we will do it.

Gloucester is out on Cape Ann—not a place you reach accidentally. You don't "happen to be driving by" when you call there. The printed greeting, a gracious welcome to anyone who has made the journey, is a tacit acknowledgment that Gorton-Pew understand he is off the beaten path and appreciate the call, even if they can't always do business. We always like to read this sign.

Economy of Byproduct Steam

PEOPLE who manage food processing plants are often unaware of the ordinary economies that are possible in the field of sound engineering. In the matter of generation of steam for processing it is possible to eat your cake and still have it. Of course, it is necessary to have the right facilities or the economy is impossible.

Recently we have seen several large plants that generate process steam equivalent to more than 1,000 hp. and yet purchase electric power to the amount of $2,000 to $4,000 a month. None of them realized that the steam can be generated at a moderately high pressure, then run through a bleeder or extraction turbine (or a uniflow engine) leaving about 90 percent of the B.t.u. in the exhaust steam at about 50 psi., which is usually plenty of pressure for all processing operations. Thus, it is possible to generate the electric power for about 10 percent of the fuel burned. Which comes reasonably close to eating one's cake and yet having it.

Admittedly the foregoing is only a principle. It requires a competent trained engineer to apply it economically, for there is a whole lot more to it than merely writing out an order for a turbine-generator set. First of all the loads must be reasonably well-balanced to achieve the maximum of the potential economy. Where the process steam demand fluctuates markedly, it may be necessary to install a steam accumulator and other accessories. If the matter interests you, if you want to save a substantial part of your fuel and power costs, the first thing is to install steam meters on your process steam lines. After you have accumulated enough data, then employ a consulting power plant engineer. He will need to study your set-up, your steam consumption, and your plans for future expansion before he can give you any notion of what economies can be made, what the installation will cost, or how long it will take to get it.

No magic is involved. There is nothing mysterious about it. The benefits can be obtained only if a plant has a fairly evenly balanced process steam and electric power load. And, of course, the bigger the two are, the greater the possibility for noteworthy economies.

How to Get Into Business

THE biggest pain in the neck since V-J Day has been the chap who says he has been referred to us by So-and-So (usually the U. S. Chamber of Commerce or some Government bureau). All he wants is complete directions for getting into the food processing industry on his own, in one letter, and "Thanking you in advance"! It is inconceivable that anyone so uninformed that he would make such a naive request could ever make a go of it alone, no matter how explicit the directions he might receive.

For the benefit of any who may seek your advice on this subject, the best course of action to follow is to tell him to get a job in whatever food processing industry interests him, and stick to it for enough years to learn something about it. By that time he ought to be able to accomplish one of three things:

1. Make himself so valuable that the employer will keep him happy.
2. Decide that the business is not as attractive as he imagined it was.
3. Pick up enough know-how to start in a modest way in his own kitchen.

If he has the stuff it takes to go it alone, the employer will usually discover it in a couple of years and use him to the best advantage. Such men are all too scarce.

Misleading per Capita Figures

PER-CAPITA consumption figures can easily lead to unwarranted conclusions as to the personal habits of people, or their nutritional status. Per-capita figures are important for calculating economic factors, but per capita averages are otherwise about as informing as averaging the temperatures of patients in a hospital.

Take sugar consumption which often attracts the attention of nutritional reformers. They love to hark back to colonial times to show how our per capita consumption has arisen from a few pounds to over 100 lb. a year. Yet Stroud Jordan of American Sugar Refining Company once made a very scholarly study of the availability of sugar to people in the days before railroads and good

roads. He calculates that where unlimited amounts of sugar were available in the "good old days," the per capita consumption was just about what we know it to be in modern times.

For marketing data, it would be more helpful if we could learn how many persons are regular consumers of an item, and how much each consumer uses per year, than to divide the annual national disappearance by the total population. Both types of figures are valuable but the latter must not be interpreted to mean more than is justifiable.

Good Soluble Coffee

IN spite of the fact that any one who asks our opinion does so at his own peril, a friend sent us a sample of an experimental lot of a new type of soluble coffee and requested our comment. When first tested it was really tops, not merely as soluble coffee, but as compared with freshly brewed coffee from the better known high quality blends.

Those Smaller Pea Cans

A MOVE is on foot to put a substantial part of the coming pea pack in No. 303 cans instead of the customary No. 406 which holds 20 oz. whereas the 303 holds about 16 oz. While it has a sound motive—to pack only enough peas to serve two persons—its timing with respect to the steel scarcity is not so happy.

Sheet steel from which cans are made is almost as scarce today as it was in the war. Curiously, there is more tin available than there is steel to put it on.

Sales departments can adapt their operations to such changes as the smaller pea can with ease. Production departments have the problem of setting up 303 lines separate from 406 lines and are wondering if they can get all the needed equipment in time to do much good.

Our Compliments to F & D A

IT is a pleasure to compliment Food and Drug Administration for its recent willingness to meet with representatives of the food industry prior to formal hearings on a food standard. The March 26 meeting, under the auspices of the Food Standards Committee that is advisory to F&DA, was novel and significant and may prove to be a landmark of progress in the standardization of foods under the Food, Drug and Cosmetic Act.

Officials of the F&DA scientific staff met with a representative group of corn canners and their technical advisors to hold a frank and open discussion of the Standards of Identity, Quality and Fill of Containers for canned corn. They explored the difficult problems involved in measuring these factors and evaluated the progress made up to date in finding their solution. Thus, government and industry are each aware of the other's problems and opinions in advance of formal detailed proposals for definition and standards of identity.

The much desired result of such a conference should be that formal standardization procedure will be deferred until adequate knowledge of all significant factors is available so that, when that time shall come, the procedure prescribed by law will be approached by both parties in a spirit of cooperation rather than controversy. Factors that involve honest differences of opinion will thus be reduced to a minimum.

Such a cooperative approach to promulgation and establishment of standards in the future will inevitably result in protection of the consumer's interest, which is always paramount. At the same time regulations should result which the processors will regard as sound and workable in their own enlightened self-interest as caterers to the consuming public.

A praiseworthy step has been taken in the direction of the ideal relationship between free enterprise and its government. May this be only the beginning of further cooperation!

Tossing Away Opportunities

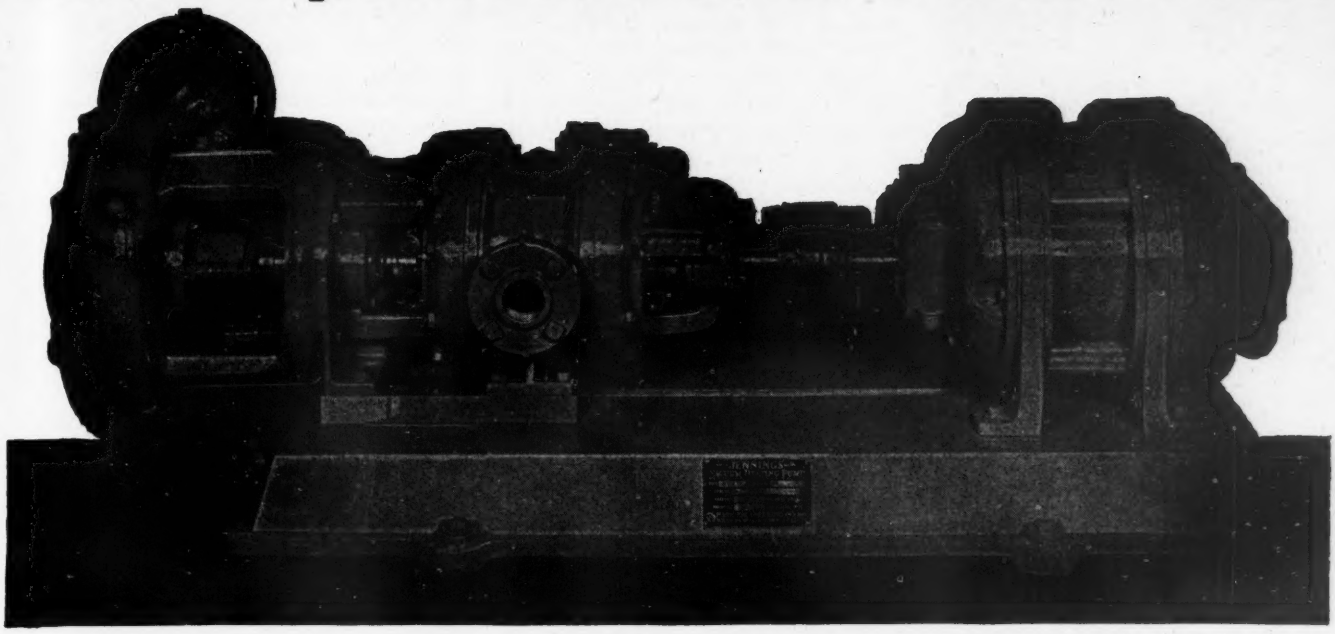
NOT that we care a hoot, but because we hate to see opportunities wasted we mention again the failure of food freezers to take advantage of the empty wall space in new frozen food stores. Soon there will be no space left and then it will be too late. The opportunity will never come again.

This neglected opportunity is a chance to display some really attractive pictures of the methods employed by the commercial freezer in the preparation of frozen foods. Most of the new frozen food stores start out modestly with a cabinet or two in an otherwise empty store room. Frequently the room is attractively decorated, but with vast areas of empty wall space. If the food freezer would supply some worth while large pictures of a few of his operations, the housewife could be rapidly educated—even the store clerks, who too frequently know less than nothing about their wares, would be far better and more accurately informed.

If we had our way about it, the pictures would be either photographic reproductions in color, or color reproductions of paintings. But even large black-and-white reproductions of photos taken by a top notch professional would be far better than nothing. Probably the job would be best undertaken by the National Association of Frozen Food Packers in order to get the proper quality at the lowest cost.

Time is flying, however, and soon it will be too late. During the past year we have watched several such stores and noted how shelves begin to appear and then fill up with all the miscellany of the ordinary grocery. Just as soon as the first real buying slump hits frozen food stores, you can expect them to convert to complete grocery stores and then there will be no more wall space on which to put any sort of educational display. It's later than you think.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

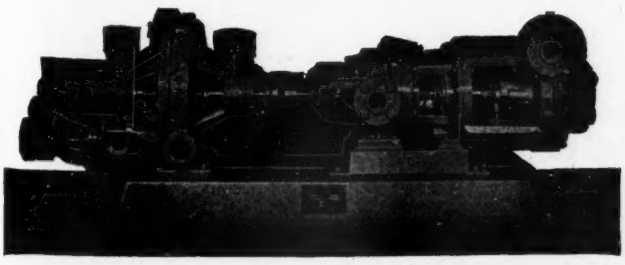


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK • CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Rice Vitamins

VITAMIN permeation is the big news in present day rice processing. Two companies in this country recently have introduced their rice, turned out by new processes, said to seal in the natural thiamin and niacin vitamins and minerals.

Rice Growers Association of California, Sacramento, produces what it calls Vi-Tamic Golden Pearl Rice. It is a California pearl rice, commonly known as Jap rice. In the process, the rice is given the conventional cleaning. Then, in a rotary drum, it is steeped in hot water. Flowing to the next drum, soluble vitamin B_1 and minerals are driven into the grain from the hull and bran by steam pressure. From there it is dropped into a rotary drier and flows on to conventional Berico rice driers and coolers, thence to tempering bins, and finally it is milled and packaged.

Vi-Tamic packs in a two lb. transparent cellulose bag.

Converted Rice, Inc., Houston, Tex., uses the H. & R. process for Converted rice, which was originated by E. Z. Huzenlaub of London. U. S. patents were first issued to him in 1941.

This process utilizes vacuum, heat and pressure to permeate the endosperm of each grain of rice with water containing the water-soluble vitamin B complex and minerals, as well as other whole grain properties found in the hulls, bran layers and rice germ. During subsequent processing, these nutrients are sealed into the grain and largely remain there after milling, washing or cooking.

Uncle Ben's Converted Rice—a long grain rice—is packed in an attractive 1 lb. package. It's slogan, "Each Grain Salutes You," is significant of the fact that this vitamin infused rice, when cooked, fluffs up and separates without becoming sticky or gummy. The yellow-brown grains cook up white and have a distinctive nutty flavor.

Converted Rice is being sold presently in the New York City area, the sales campaign being accompanied by magazine, newspaper and radio advertising.

Films for Foods

VINYLITE plastic films, put out by Bakelite Corp., New York, are fast invading the food field. Most significant of recent developments is the Vinylite protective film for fresh produce and a frozen food package consisting of aluminum foil coated with the vinyl material.

Vinylite elastic plastics are produced from vinyl resin compounds. They are based on vinyl chloride and vinyl chloride acetate resins. The films are thin yet extremely tough and strong. They are particularly adaptable to prepackaging fresh fruits and vegetables.

Rowe Packaging, Ltd., Toronto, fabricates, sells and distributes the non-toxic Vinylite film.

The Vinylite-coated aluminum foil pack for frozen foods was developed and is made by Rap-In-Wax Paper Co., Chicago. Called Foilrap, it is said to be tough and to assure longlasting purity of contents.

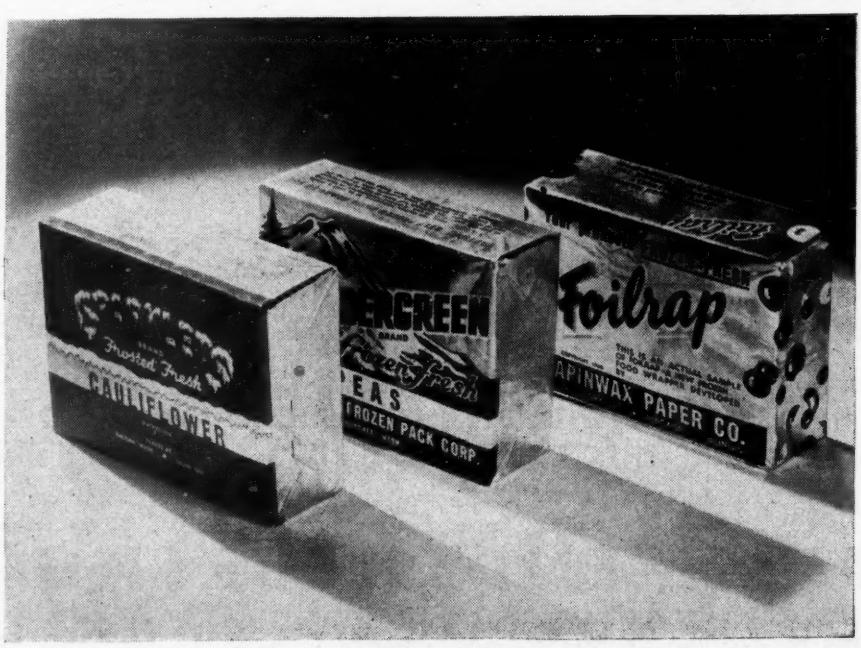
Kelly, Farquhar & Co., Tacoma, Wash., and Cedergreen Frozen Pack Corp., Wenatchee, Wash., are using this wrap for their consumer packs of quick frozen fruits and vegetables.

Lobster Deluxe

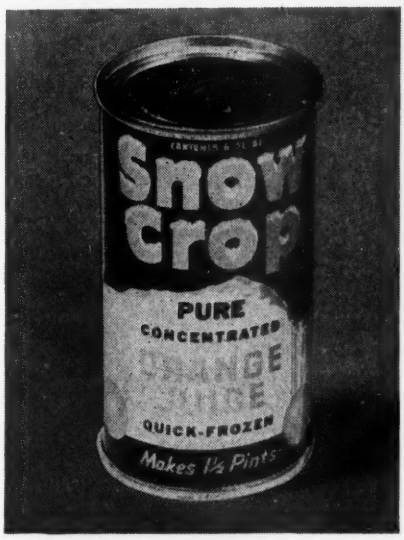
ANTHONY C. GEORGE, president of Atlantic Lobster House, Inc., Boston, is credited with the development of a fully prepared and stuffed frozen lobster.

The housewife can now run into a frozen food store following an afternoon tea or movie, purchase a lobster and whisk it home. She will pop the crustacean in the frozen state into a hot oven—500°. After twenty minutes of cooking, her husband should be convinced that she has spent several laborious hours in the kitchen.

The lobsters, packed three to a carton, are split open and spread



with bread crumbs. Frozen in this form, the company says that research and experiments show that the principal nutrients, protein, carbohydrates, fats and minerals, remain substantially unchanged.



It's High Vacuumed

QUICK frozen orange juice is rapidly gaining popularity on a national scale.

The concentrate distributed by Snow Crop Marketers, Inc., New York, is packed 6 fl. oz. to a can. When diluted it makes 1½ pints of full flavored orange juice.

The product is prepared at Vacuum Foods Corp., Plymouth, Fla., by a new high vacuum process. The natural water is removed from the juice at low icy temperatures, thus retaining the flavor and aroma of sun-ripened fruit.

Snow Crop uses a handy lacquered tin, designed in royal blue, green and orange.

This One's Spicy

GOOD old apple pie is the particular target at which Durkee Famous Foods, Elmhurst, N. Y., has aimed its newest blend of spices.

Apple Pie Spice consists of cinnamon, nutmeg, allspice and ground orange peel. Durkee flavor experts recommend ¾ teaspoon of the spice for an 8-in. pie. The product also is recommended for rice pudding, fruit cake, cookies and all other apple dishes.

The spice is packed in the standard 2-oz. metal container used for other Durkee spices.

Foiled Again

ALUMINUM foil takes a front seat in the Walter Baker Chocolate and Cocoa Division of General Foods Corp., Dorchester, Mass. The company has gone all out for foil protection in its package revamping.

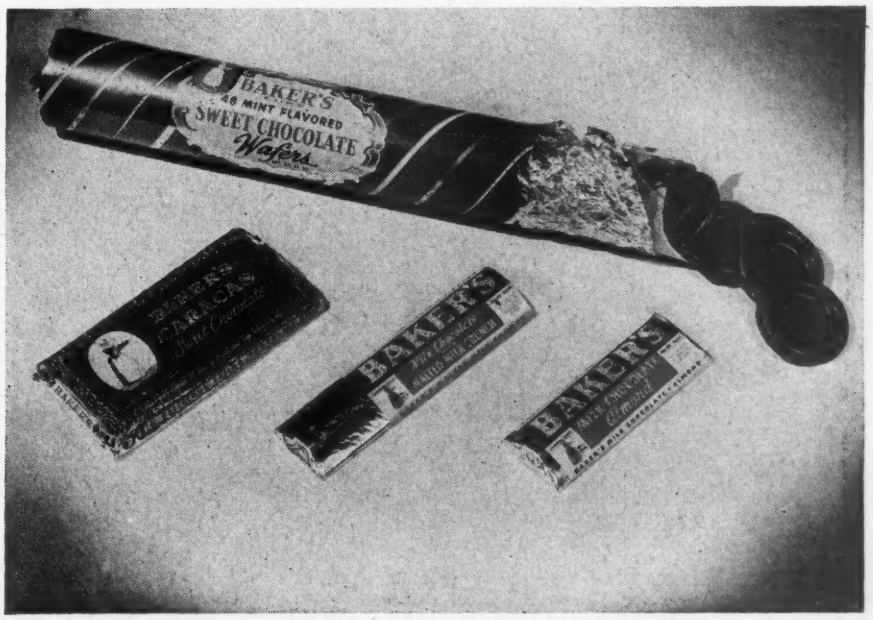
First to appear was the candle wrap for Bakers Sweet Chocolate Wafers. Foundation of the container is a heavy cardboard tube with a paper liner. The outer protector is laminated aluminum foil.

The bright green foil has yellow and silver barber pole stripes. A yellow label face is printed in red and green.

Baker's new five cent bars (reduced to ⅞ oz. in order to sell at the old price) are packaged in a thin sheet of aluminum foil with the usual printed paper wrapper. Different colored bands denote the various kinds of bars.

An inner paper wrap and a laminated foil overwrap are used for Baker's Caracas Sweet Chocolate. Design is in keeping with the Venezuelan city for which the chocolate was named.

The story of South American cocoa is told by a colorful picture and descriptive material on the back of the package. The front is a gold background with brown scroll and royal blue panel containing the necessary product information.



You are entitled to know the real facts behind the can situation

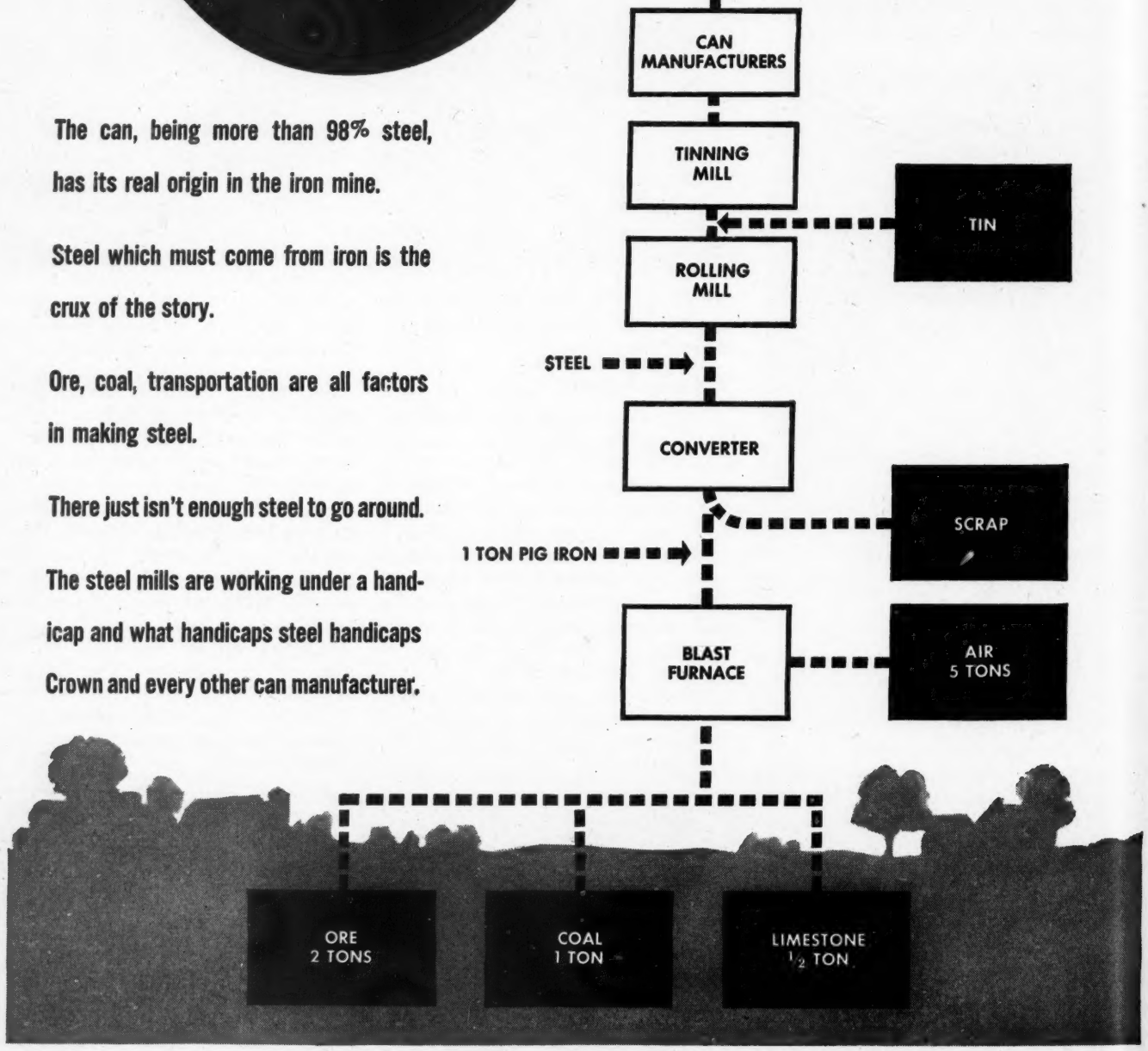
The can, being more than 98% steel, has its real origin in the iron mine.

Steel which must come from iron is the crux of the story.

Ore, coal, transportation are all factors in making steel.

There just isn't enough steel to go around.

The steel mills are working under a handicap and what handicaps steel handicaps Crown and every other can manufacturer.



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FOOD INDUSTRY NEWS

GENERAL

Frozen Food Packers Study Factors in Tighter Markets

Exhibits show promise of relieving retail bottlenecks while the discussions stress the industry's danger zones

EXHIBITS at the first National Frozen Food Industry convention and exposition, in San Francisco, in late March, gave a picture of the frozen food field, from seeds and agricultural equipment to retail type frozen food cabinets. Cabinet manufacturers indicated that the shortage of this equipment, which has curtailed expansion of retail frozen food sales during and since the war, may be over this spring.

Both bag filling and carton wrapping packaging machinery showed advances in efficiency over previous models. Package displays indicated an awakening to the need for attractive "selling" packages. The use of metal or part metal containers for fruits and vegetables and that of flexible cellulose covers for the packaging of poultry and meats were the outstanding advances in packaging.

Other exhibits included mechanically refrigerated trucks and trailers, which will maintain zero temperatures; frozen fruits pretreated with ascorbic acid (no blanching); warehousing and conveying equipment; papers and printing displays; power, processing and refrigeration machinery and insulation materials.

In the discussions five points were stressed: (1) The necessity for a cautious evaluation of markets—no more promiscuous, speculative packing for a ready made market and no more easy riding on war-born shortages; (2) a tightening of bank credit; (3) the imperative need to educate the buying public in the handling and use of frozen foods—no food industry can become great until it produces in volume for mass marketing; (4) a critical need for more sales outlets and better distribution to these outlets, and (5) last, but most important, quality must be paramount in all production.

The changing economics of the industry were pointed out by Frank E. Jerome, vice president, First National Bank, Seattle, Wash., who warned the industry that "the days of easy lending are over" and "processors must now put up a real margin of their own money." The large 1947 inventory of frozen foods and the low quality of some of this merchandise has thrown credit into a "state of flux." It can be steadied only by an industrial balance of experienced personnel, capital, management, organization, good consistent quality, liquidation of inventories (even to dumping unsalable merchandise) and sound financial and distributional practices.

Frozen foods are not considered as competitors of canned goods—it is the fresh market they seek to invade. According to E. E. Huddleson, retiring president of the Frozen Food Producers, 89 percent of every American food dollar is spent on fresh foods. Of this he estimates a potential 45 percent comprises the possible market for frozen foods. This is the star to which the frozen food packer may hitch his wagon.

Whether such a potential is ever realized is, according to Emil Brisacher, president of Brisacher, Van Norden & Staff, dependent upon "Elmer," the little man who spends a great deal of money.

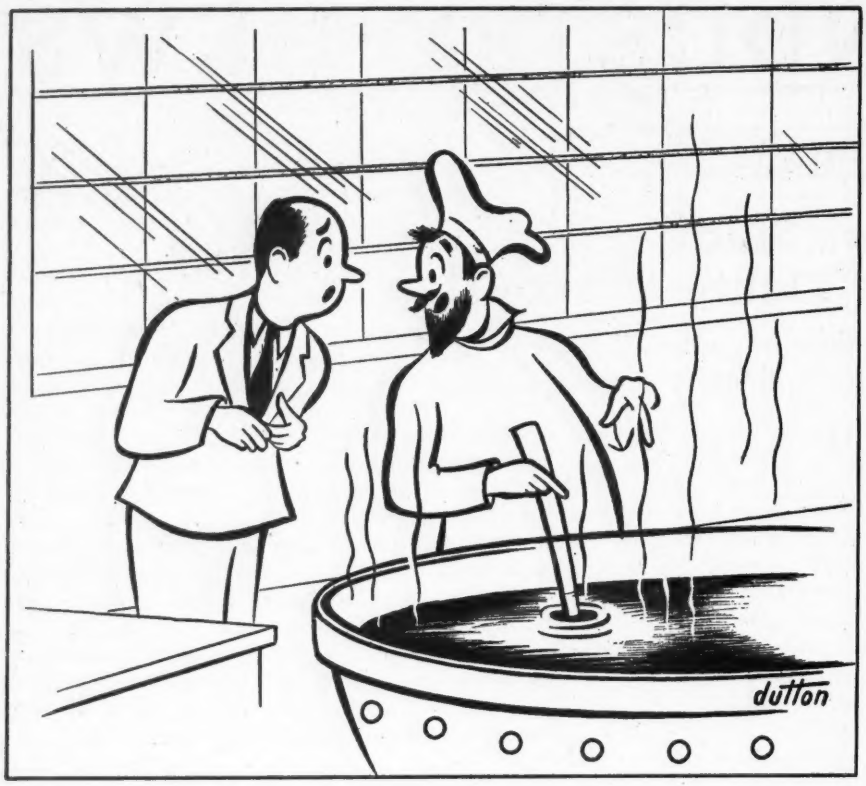
C. Courtney Seabrook, newly elected president of the National Assn. of Frozen Food Packers, summed up the results of the San Francisco meeting as "a clearer understanding of the overall situation in the frozen food industry." The association announced a revision of its by-laws which will now admit packers of frozen meat, seafood, poultry and precooked frozen foods to full membership. While the 1947 season is looked upon as the "shakedown year," the industry is said to be ready to move ahead with optimism, albeit a little more cautiously and with more accent on quality and research.

General Foods Sales

DOLLAR sales of the General Foods Corp., in 1946, reached $330,897,107, topping the previous year by 14.1 percent. This was the ninth consecutive year that sales reached a new record high. Net earnings, according to the annual report issued by board Chairman Clarence Francis, were $18,147,515, or $3.25 a share, after providing $3,000,000 for contingencies. The 1945 net earnings came to $2.36 a share. No contingency provision was made in 1945. On a sales basis the net earnings were 5.7 percent.

QUANTITY PLOWING

Eighteen tractors and 108 plows turned over 350 acres in one day on a farm, near LaCrosse, Wash. The neighbors turned out to do the job when Peter Solem was hurt in an automobile accident and was unable to finish his spring plowing chores.



"Tell them to label this batch chili con carne. I had a little accident with the pepper!"

Supreme Court Refuses To Rule Out Discounts

THE Supreme Court's ruling in April, affirming American Can Co.'s claim of $114,000 against Bruce's Juices, Inc., Florida citrus canners, for cans supplied over a period of years, ends a case that had been before the high court for a year and a half. The decision, in effect, upholds the right of a supplier to provide a discount system favoring large purchasers, despite the apparent opposite wording of the Robinson-Patman Act.

American Can had originally sued Bruce's for the amount of a number of defaulted promissory notes. Bruce replied that the notes were unenforceable because the cans involved were purchased in a transaction that violated the Robinson-Patman Act. The Florida courts held that such a defense could not be used in a state court and that the bill was collectable. The case was then taken to the Supreme Court, where a 4-4 decision, last October, upheld the Florida Court. Bruce asked for a rehearing before the full court and the opinion, written by Justice Jackson, who was absent at the first hearing, brought a 5-4 ruling to uphold the lower court.

In his opinion Justice Jackson said in part that, the court was not deciding whether quantity discounts violated the Robinson-Patman Act, but he declared that "it would be a far reaching decision to outlaw all quantity discounts." Such discounts, he said, were in general use in the wholesale and retail trade throughout the country, and "Congress refused to declare flatly that they are illegal."

In the dissenting opinion, Justice Murphy said the decision failed to meet the issue, which was "whether sellers of goods should be allowed to use the courts to collect price differentials which have been made illegal by Congress. The unmistakable effect," he continued, "is to permit the recovery of discriminatory prices despite the plain language of the (Robinson-Patman) Act and despite the lessening of competition that might thereby result.

South Am. Speculation May Cut Tin Delivery

UNLESS U. S. government tin purchasing agents can break down a quasi-cartel in concentrates in Bolivia shortly, this country will be critically short of the metal by fall. Tin is vital in container, bearing and solder production.

A combine of small tin producers in Bolivia, from whom the U. S. has been buying tin concentrates, are now asking for a 10-cents a pound price increase before signing a new contract. To emphasize their determination, the Bolivians have already sold about half of the concentrates available for 1947 to Argentina. The Argentine has no smelting facilities and is evidently holding the raw material for speculative purposes.

The 10,000 tons (metal content) of Bolivian concentrates left for sale to the U. S. must be brought into this country to keep the government-owned Texas City Tin Smelter in operation. The smelter's output of 3,000 tons of tin a month has been the deciding factor in maintaining adequate supplies of the metal here.

Total permitted uses for tin call for a monthly allocation of about 6,000 tons by the government. The smelter produces half of the supply, imports of pig metal contribute another 1,500 tons, and the remainder is taken from the stockpile.

With Far Eastern production of pig tin crippled by exchange difficulties in Siam, a coal shortage in Malaya and the Netherlands, and shipping shortages, added to the loss of the Texas smelter's output, the U. S. stockpile of the metal would not be able to keep up with a monthly drain of 5,000 tons a month for long. The stocks now amount to about 16,000 tons.

Even with the 10,000 tons of Bolivian metal added, the stockpile will be close to exhaustion by fall. Production in the Far East is expected to pick up by then, however. One American and several Dutch tin dredges are already on the way to Malaya, and several more will leave here in the near future.

Atlantic Coast Fisheries Win FI Award

Just as we go to press the jury composed of members of the Institute of Food Technologists gave the first biennial Food Industries Award for Technological Achievement to the Atlantic Coast Fisheries Co. for the development of the automatic fish filleting machine.

The award, to be presented at the June 2 meeting of the Institute of Food Technologists, at a luncheon at the Statler Hotel, Boston, consists of an 18x26 inch bronze plaque. A reproduction of the plaque, and the story of the development, will be in our June issue.

RFC Moves to Recover Meat Subsidy Pay

FIRST government move to recover subsidy payments paid or accrued on packers' inventories of Oct. 14, 1946, has been announced by the Reconstruction Finance Corp. Trouble is ahead for those who are not prepared to repay Uncle Sam what is due.

All packers must show proof of their volume, but the government will not attempt to recapture from small operators with minor quantities of meat in their inventories when price controls finally went off. Cut off is a total of 500,000 lb. live weight of cattle, calves and hogs killed during the months of May, June and September, 1946.

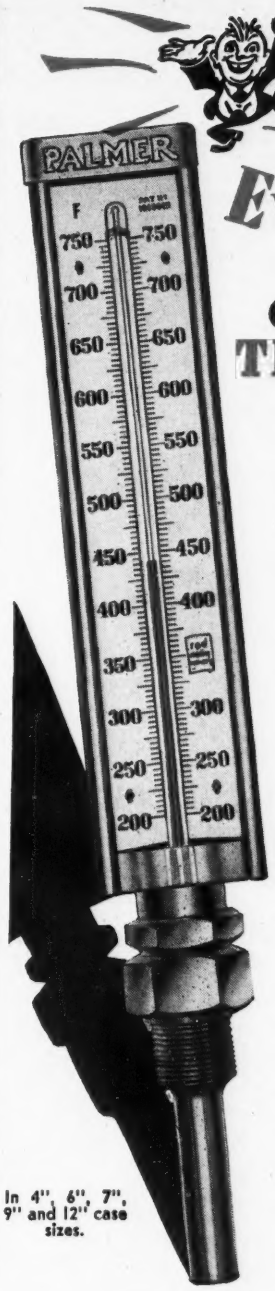
Variables Determine Price Support Costs

ANY estimate of the future cost of the agricultural price support program must be a variable one. It depends on the level of industrial activity and the income of the average American wage earner. It also depends upon size of crops. A sharp decline in industrial activity could be reflected in huge payments for price supports. A sharp falling off of foreign demand while agricultural production in this country is at a high level would have the same effect. On the other hand, a severe drought would change the picture abruptly in the other direction. Only estimate of the cost is to be found in the testimony of the Secretary of Agriculture before the House Committee on Agriculture and in the Budget which provides $161,000,000 for the fiscal year commencing July 1. The budget figures by commodities follow:

Basic Commodities, peanuts for nuts	16,000,000
Steagall Commodities:	
Dressed chickens	10,000,000
Eggs	43,000,000
Flaxseed	7,000,000
Potatoes, sweet	9,000,000
Potatoes, white	28,000,000
Turkeys	6,000,000
All others:	
Wool	42,000,000
Total	161,000,000

Present laws permit the Department of Agriculture to engage in many types of support operations. In addition to bolstering the shaky market prices of eligible commodities, prices can be supported to encourage production of scarce products. Flaxseed, for example, has a $6 per bushel guarantee support for that purpose.

Purchase of spot surpluses may



In 4", 6", 7", 9" and 12" case sizes.

Everyone's Excited about this GREAT NEW THERMOMETER

WE DON'T expect *your* temperature to rise, but frankly, everyone's excited about the new Palmer Extruded Brass Case Thermometer. Never, since the introduction of the now-famous "Red-Reading-Mercury" by Palmer, have such exclusive and important advantages been offered to industry. So you'll have to excuse our pride . . . pride in the new thermometer and in the Palmer technicians who have produced this outstanding development. The skill, knowledge and long, hard work of our engineers have resulted in another Palmer "first." Frankly, we're proud and here's why—

- EXTRUDED BRASS CASE—Completely new design assures greater visibility, longer service.
- MUCH LARGER READING SCALE—New case design increases readability, eliminates waste space, permits a full one-piece reading scale.
- GREATER PROTECTION TO TUBE—Double Strength, non-rattling glass shield and V-shape case design prolong tube life.
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- FAMOUS PALMER red reading mercury FOR GREATER VISIBILITY.
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- DUST-PROOF, FUME-RESISTANT

Send your thermometers (all makes) to be repaired so Palmer technicians can modernize them, adding all of the features above at nominal cost.

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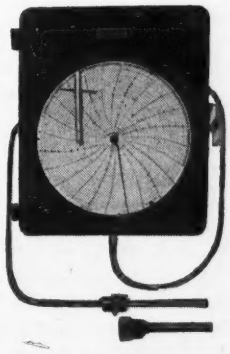

RECORDING THERMOMETERS. Extremely accurate and sensitive, constructed for long service. Mercury actuated. 12 in. die-cast aluminum case. Flexible armored tubing and bulb of stainless-steel. All ranges up to 1000F or 550C.

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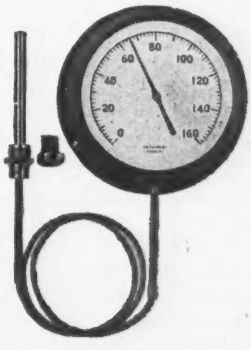

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FINAL PROGRAM

Institute of Food Technologists

Hotel Statler, Boston, Mass. **June 1, 2, 3, 4, 5, 1947**

Sunday, June 1
Morning

Council Meeting.

Afternoon and Evening

Registration.

Evening

Symposium—Potential Applications of Colloidal Chemistry in Food Processing.
Discussion Leader: Dr. Ernest Hauser, Professor Massachusetts Institute of Technology.

June 2
Morning

Address: President E. H. Harvey.
General Announcements:
Dr. S. C. Prescott, Chairman.
New England Section Arrangements Committee.
Address: Relation of Food Technology to Company Management.
Philip W. Pillsbury, President
Pillsbury Mills, Inc.
Minneapolis, Minn.
Address: Relation of Technology to Sound Company Financing.
Lawrence F. Whittemore, President
Federal Reserve Bank of Boston
Boston, Mass.
Address: Good Human Relations Pay Dividends.
C. P. McCormick, President
McCormick & Co.,
Baltimore, Md.

Noon

Luncheon
Presentation: Achievement Award.
L. V. Burton, Editor
Food Industries
New York, N. Y.
B. E. Proctor
Chairman of Award Jury
Massachusetts Institute of Technology
Cambridge, Mass.
Acceptance: Achievement Award.

Afternoon

Address: Organization and Management of Research and Development.
Louis E. McCauley, Vice President
Armour and Company
Chicago, Ill.
Address: Methods of Obtaining Costs on Research Projects.
Thomas M. Rector, Vice President
General Foods Corp.
New York, N. Y.
Address: Value of Industrial Research Institutes to Food Technology.
W. L. Campbell
Professor of Food Technology
Massachusetts Institute of Technology
Cambridge, Mass.
Dedication of Prescott Laboratories.
Inspection of M.I.T. Laboratories

Evening

Banquet
Presentation: Nicholas Appert Medal Award.
C. C. Ziegler, Chairman
Chicago Section
Mathematics and Experiment in Food Technology.
Acceptance: Charles Olin Ball
Technical Director
Owens-Illinois Glass Co.
Toledo, Ohio
Address: To be announced.

June 3
Morning

Sanitation in Food Handling and Storage.
The Food Industry Needs Self Control.
H. C. Diehl, Director and Secretary
Refrigeration Research Foundation
Berkeley, Calif.
Recent Developments in Transportation and Storage of Raw Materials for Processing.
W. T. Pentzer
Division of Fruit and Vegetable Crops and Diseases.
U. S. Department of Agriculture
Fresno, Calif.
Modern Methods of Treating and Packing Fresh Foods for Rapid Transport.
What World War II Revealed in Transportation and Storage of Processed Foods.
Hatton B. Rogers, Jr.
Director of Quality Control
Phillips Packing Co.
Cambridge, Md.

Noon

Luncheon

Afternoon

Processing Sanitation.
Proper Specifications for and Usage of Stainless Steels to Achieve Sanitation and Corrosion Resistance in Food Processing.
Richard C. Cunningham
Chief Metallurgist
Industrial Steels, Inc.
Cambridge, Mass.
Detergents for Food Plants and Methods for Their Evaluation.
H. A. Trebler
Research Laboratories
National Dairy Products Corp.
Baltimore, Md.
How to Improve Sanitary Control Through Equipment Design.
Dairy Products and Liquid Foods.
E. H. Parfitt
Sanitary Standards
Evaporated Milk Association
Chicago, Ill.
Meats and Meat Products.
H. E. Kingman, Jr.
General Superintendent's Office
Wilson & Company
Chicago, Ill.
How California Instituted Sanitary Control in Food Plants.
Karl F. Meyer
George Williams Hooper Foundation
University of California Medical Center
San Francisco, Calif.
Business Session.

Evening

Boston Symphony Orchestra
Pop Concert.

June 4
Morning

Session I—Refrigeration and Freezing.
Description and Evaluation of Freezing Systems.
R. C. Poole
Research and Development Engineer
Birds Eye-Snider Division
General Foods Corp.
New York, N. Y.
Factors in Bacteriological Deterioration of Frozen Foods.
Charles H. Harp
Food and Container Research Institute
U. S. A. Quartermaster Corps.
Chicago, Ill.
Preparation of Foods for Freezing.
Alvin I. Nelson, Technical Supervisor
Frozen Fruits and Vegetable Dept.
Loudon Manufacturing Co.
Terre Haute, Ind.
Sanitation Technics for Frozen Food Plants.
Barbara Louise Hutchings
College of Home Economics
Drexel Institute of Technology
Philadelphia, Pa.
Walter Lord Obold
Professor Bacteriological Sciences
Drexel Institute of Technology
Philadelphia, Pa.
Session II—Problems in Fish Technology.
Use of Bacterio-Static Agents in Fish Handling and Processing.
Cecil G. Dunn
Department of Food Technology
Massachusetts Institute of Technology
Cambridge, Mass.
Mechanism of Spoilage in Sea Foods.
Carl R. Fellers
Department of Food Technology
Massachusetts State College
Amherst, Mass.
Practical Technics in Preservation of Fish and Fish Products.
Hugo W. Nilson
Norman D. Jarvis
Fishery Technological Laboratory
Fish and Wildlife Service
College Park, Md.
Recent Developments in Fish By-Products.
H. L. A. Tarr
Fisheries Research Board of Canada
Vancouver, B. C.
Session III—Submitted Research Papers
Bacteriology of Food Packaging Materials.
Louis C. Barail
United States Testing Co.
Hoboken, N. J.
Evaluation of Foam Producing Agents.
Ralph M. Bohn
Food Products Research and Development
Archer Daniels Midland Co.
Minneapolis, Minn.
Storage Characteristics of Frozen Orange Juice Concentrates.
R. H. Cotton
Florida Research Laboratory
National Research Corp.
Plymouth, Fla.
W. R. Roy
Chief Chemist
Vacuum Foods Corp.
Plymouth, Fla.
Removal of Sugar from Raw Egg-White by Yeast Before Drying. J. C. Ayres, Y. H. Yare, W. S. Ogilvy, R. W. Kline and G. F. Stewart Bacteriology Section, Iowa Agricultural Experiment Station, Ames, Iowa.

Afternoon

Boat Excursion to Gloucester.
Inspection of Gloucester Fisheries.

Evening

Clam Bake and Lobster Feed at Birdseye Estate.

June 5
All Day

Food Plant Trips.

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again be carried on as was frequently done before the war. The Department has completed recently a concentrated orange juice purchase program in Florida. The juice was procured under authority of Section 6 of the National School Lunch Act, but it was a support operation, nevertheless.

So far the only policy statement by the Department of Agriculture has been on eggs. Support will be a national average egg price of ninety percent of parity. Support will be through the purchase of dried and frozen eggs. The Department will buy shell eggs only as a last resort.

The reason for limiting purchases to dried or frozen eggs is that the government stands a good chance of finding a market for them abroad and, if they have to be disposed of on the domestic market, the sale can be handled so as not to depress the price of shell eggs during flush production.

A turkey purchase program to operate nationally until June was announced in February in anticipation of a decline in the price of gobblers below parity level. The mere announcement had a stabilizing effect on turkey prices. Purchases under this program have not been great. Anything that the government may acquire will be sent to Great Britain to augment meat supplies there.

The dried skimmed milk purchase program is to encourage the development of domestic outlets for powdered milk at price reasonable for both the producer and consumer. This is considered to be he first move toward the establishnent of a support program for milk.

A large egg surplus is in prospect for 1948. Even a drought would not help cut production because of the ample feed supplies which will be available. Egg production was not hurt in the drought years of 1934 and 1936 when feed supplies were very low.

No trouble is in sight for wheat until the crop of 1949. Foreign requirements will take up the slack in 1947, and a billion bushel crop in 1948 would mean no more than some stock accumulation.

Oil seeds are not expected to give trouble although there is some possibility that the $6 support price for flaxseed might boomerang if Argentina should suddenly let loose a large quantity at a reasonable price. This is only a remote possibility.

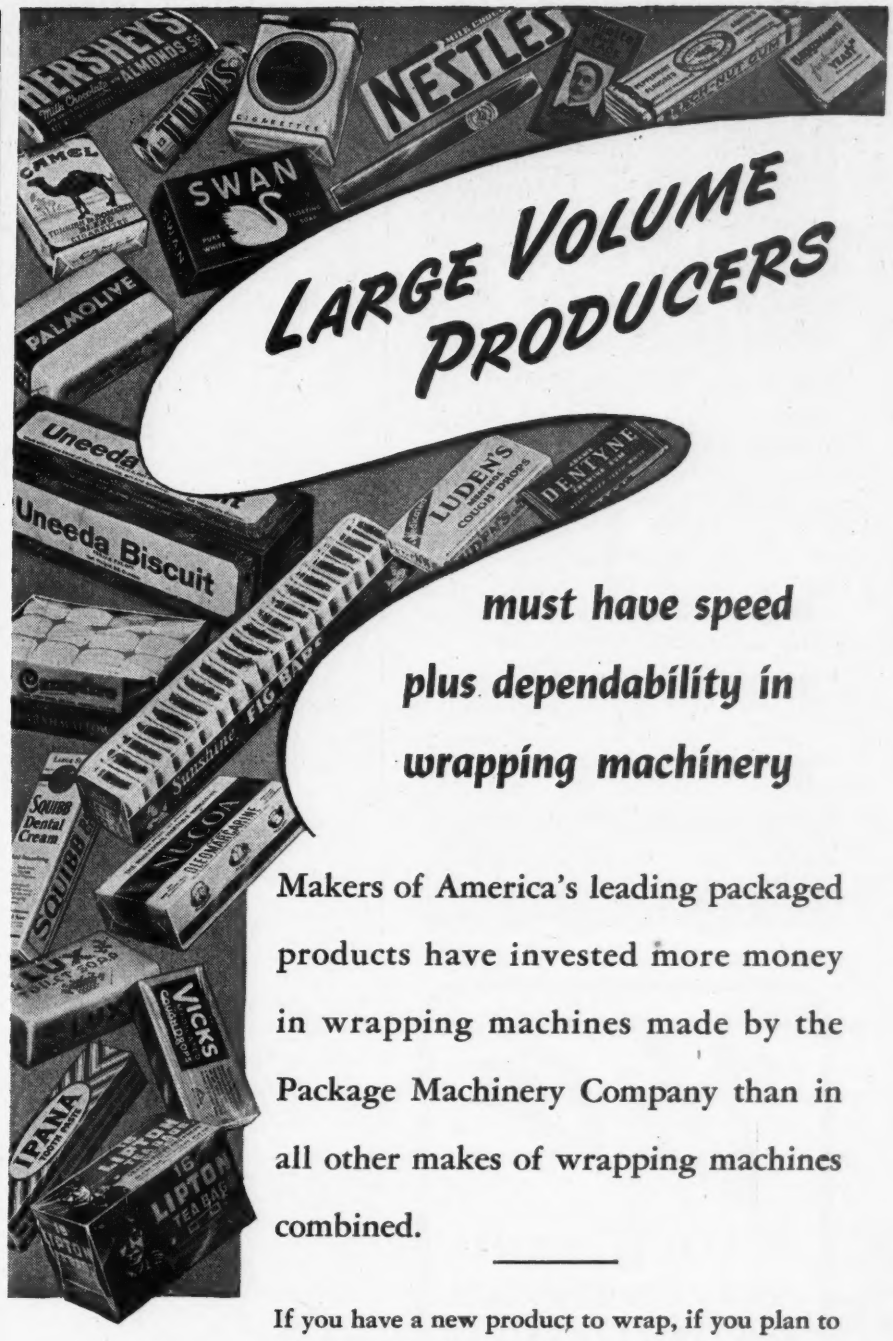
Some spot surplus removal operations are in prospect for fruits and vegetables. Dairy support prices have not yet been announced but the industry is laying the ground work for later action.

Hogs are now at such a high price that it will be a long, long time before the prices settle back to support levels.

F&DA Says Trim Figure Not From Wonder Bread

FOR years the baking industry has been bedeviled by the popular impression that starches are fattening. Continental Baking Co. decided that something should be done about it. Bread, it represented, can be a means of reducing weight. A dietary regimen, which includes six slices a day, was printed on wrappers of its Wonder Wheat Bread.

The U. S. Food & Drug Administration took exception to Continental's claims, has asked the fed-



LARGE VOLUME PRODUCERS

must have speed plus dependability in wrapping machinery

Makers of America's leading packaged products have invested more money in wrapping machines made by the Package Machinery Company than in all other makes of wrapping machines combined.

If you have a new product to wrap, if you plan to stimulate sales by restyling your current package, or if you are interested in cutting costs by increasing the over-all efficiency of your present packaging set-up—consult our nearest office. We'll be glad to supply you with complete information on any of our machines, or if you prefer, to discuss your packaging problems with you in person.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts

30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 849 Marietta St., N. W., Atlanta 3
443 S. San Pedro St., Los Angeles 13 • 509 17th St., Denver 1
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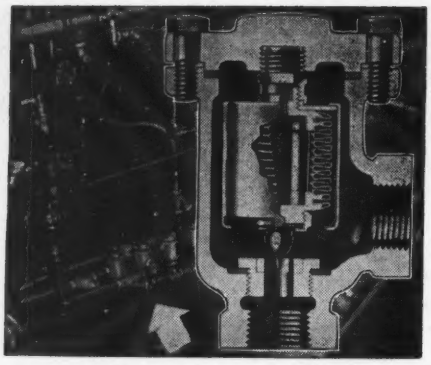
PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines



Steam Trap for Heavy Steam Users

In process work, cooking time is governed more by air venting than trap capacity or speed. Actual output of cooking and similar equipment will be greatly increased.

The new No. 9 will operate almost as fast as a bucket trap—but have full capacity at condensate temperatures within 20 degrees of the steam.

Like other No. 9 s, this trap is wide open when cold. It can't freeze. It requires no seat change when pressures change. It is small, inexpensive and easy to install. Ask for Bulletin No. 250.

199

SARCO COMPANY, INC.
475 Fifth Avenue, New York 17, N. Y.
SARCO CANADA LTD., 85 Richmond St. W., TORONTO 1, ONT.

Vi-Co

NATURAL "B" COMPLEX YEAST VITAMIN PRODUCTS AND YEAST DERIVATIVES

Plasmolyzed Yeast Extracts for FOOD and AMINO ACID PREPARATIONS

Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product rich in essential amino acids. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

These products possess a definite "meat-like" flavor useful in enriching soups, bouillon cubes, tomato juice and other packaged foods. Such enriched foods are also of value for their natural B complex and high amino acid composition.

Consult us about your vitamin or yeast problems. Our technical staff can best advise you how Vi-Co products can be used to enrich your own products.

VICO PRODUCTS CO.
415 W. Scott St. • Chicago 10, Illinois

eral district court for the District of Columbia for an injunction to stop nationwide sale of the loaf under the wrappers objected to.

The Wonder diet is based on a chart which prescribes caloric intake for a given age, height and weight, with the bread supplying most of the calories. According to the FDA complaint, Continental promises a "trim military figure" without drugging, purging, exercising or "fainting on a lettuce leaf." FDA contends that the promise can't be fulfilled.

Staples Becomes Head Of Hershey Chocolate

P. A. STAPLES was elected chairman of the board and president of the Hershey Chocolate Corp., at a meeting of the board of directors, immediately following the annual meeting of stockholders, at Hershey, Pa., late in March. Mr. Staples succeeds William F. R. Murrie, retired. Directors elected were O. E. Bordner, Ezra F. Hershey, P. N. Hershey, L. W. Majer, D. Paul Witmer, J. J. Gallagher and Mr. Staples. Mr. Gallagher, general sales manager, is the only new member of the board. An executive committee consisting of Mr. Gallagher, Mr. Majer, Mr. Staples and P. N. Hershey.

The new chairman and president has been a member of the Hershey board since 1927. He is also president of the Hershey Trust Co. and a trustee of the Hershey Industrial School.

FAO Surveys Sought By Balkan Countries

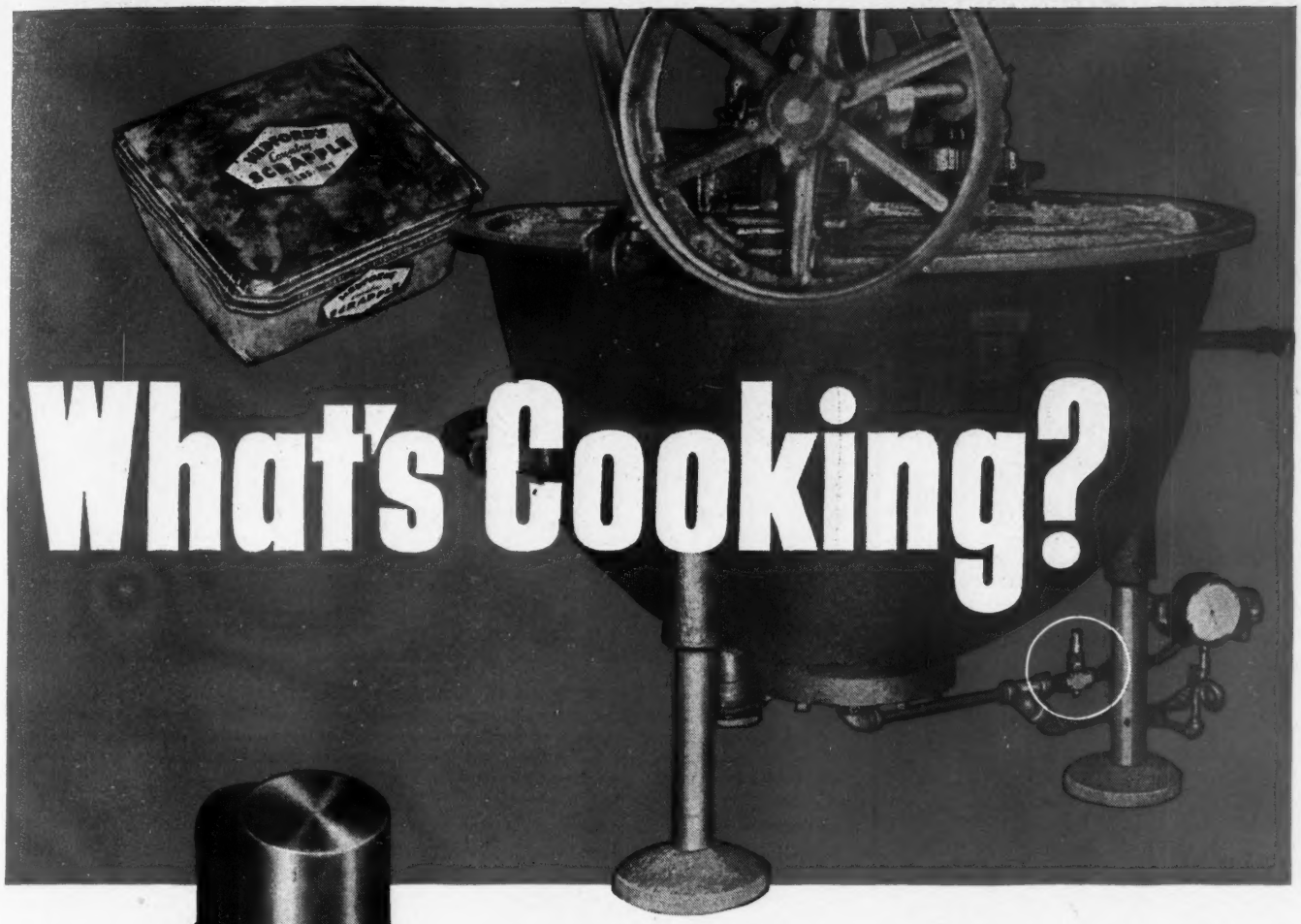
JUGOSLAVIA and possibly some other Balkan countries under the Russian sphere of influence have already made informal inquiries regarding an FAO survey of their problems relating to food, agriculture, fisheries, forestry and water supply similar to the survey made by FAO's mission to Greece. Formal requests for a survey will not be made until the peace treaties with these former enemy countries have been ratified by the Senate. A similar proposal by Poland has already been announced.

Of course, there is no question that the Polish petition and the preliminary moves of the various Balkan countries have been made with the full knowledge and consent and probably the blessing of Moscow. What action will be taken by the Food and Agricultural Organization is problematical. At the moment it appears that the Polish proposal will be turned down. The recent change in the government in Poland is the basis for this view.

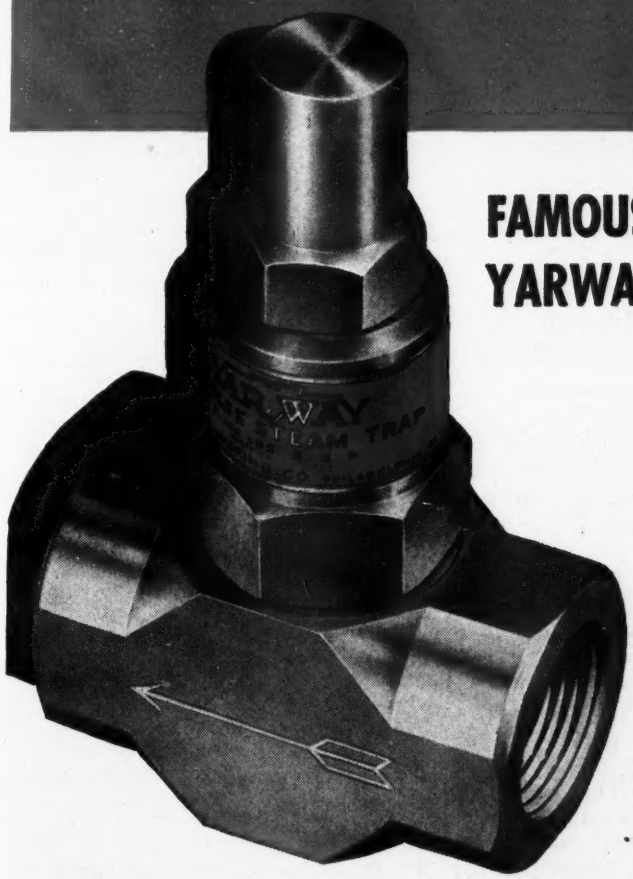
Win Awards

MANY organizations in the food field or intimately connected with it were recognized by the awards of the American Public Relations Association for outstanding achievements in public relations. Of the 16 "Oscar" winners, Donut Corp. of America and Bert Nevins received the award for meritorious

HELPS HARVEST SUGAR CANE
This small mobile crane is equipped with a two-line sugar cane grapple to pick up cane from the windrows and thus speed the loading operation. This is one of the improved machines designed by the Blaw-Knox Co. with the help of growers.



FAMOUS COUNTRY SCRAPPLE . . . AND YARWAYS GET IT HOTTER . . . SOONER



At the Chester Packing and Provision Co. is made that famous Philadelphia specialty—country scrapple. And to get their large 600-lb cookers hot . . . in a hurry . . . Chester Packing has installed those famous Yarway Impulse Steam Traps.

With Yarways on the job, the cookers not only get hotter, sooner . . . they *stay hot.* That's because when the condensate load is heavy, Yarways discharge *continuously* until the lines and jackets are cleared. Then when the equipment reaches working temperature the discharge is *intermittent,* keeping it at peak efficiency.

There is a minimum of maintenance with Yarways. They have but one moving part, a simple valve . . . no floats, buckets, bellows or diaphragms. The trap body is machined from cold rolled steel bar stock and cadmium plated . . . rugged, built to *last.*

For your own plant consider this fact—it often costs no more to replace with new Yarways than to repair other type traps.

Over 400,000 Yarways have already been purchased. See your nearby Mill Supply Dealer or write for Bulletin T-1739.

Ask about the Yarway 30-minute color motion picture, with Lowell Thomas, available for group showings.

YARNALL-WARING COMPANY, 127 Mermaid Ave., Phila. 18, Pa.

YARWAY IMPULSE STEAM TRAP

New!
20-Mill
Plastic
Basco-TEX
PLASTIC
APRONS

Will Not Crack or Peel

POSITIVE PROTECTION against WATER, OIL, ACIDS, ALKALIES

NO LAUNDERING *Just wipe off with a damp cloth. A tremendous cost saver.*

20 MILL PLASTIC
10 Times Stronger than Cloth
Cost only about **1** cent a day

PRICES—COLORS—SIZES

WHITE—
4 Mill Plastic
27 x 36..$ 6.62 per doz.
30 x 36.. 7.53 per doz.
36 x 40.. 7.96 per doz.
36 x 44.. 8.85 per doz.
Full Length Sleeves $6.00 per doz. pair

BLACK or WHITE —8 Mill Plastic
27 x 36..$ 9.00 per doz.
30 x 36... 9.75 per doz.
36 x 40.. 11.15 per doz.
36 x 44.. 13.65 per doz.
Full Length Sleeves $10.65 per doz. pair
Leggins, Hip Length $13.10 per doz. pair

MAROON—Heavy Doubled Coated Neoprene
27 x 36..$12.50 per doz.
30 x 36.. 14.00 per doz.
36 x 40.. 18.35 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per doz. pair
Leggings, Hip Length $23.50 per doz. pair

BLACK—
12 Mill Plastic
27 x 36..$10.25 per doz.
30 x 36.. 11.15 per doz.
36 x 40.. 14.25 per doz.
36 x 44.. 15.80 per doz.

BLACK — Heavy Double Coated Neoprene
27 x 36..$12.90 per doz.
30 x 46.. 14.00 per doz.
36 x 40.. 18.33 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per doz. pair
Leggins, Hip Length $23.50 per doz. pair

BLACK or WHITE —Extra Heavy 20 Mill Plastic
27 x 36..$14.20 per doz.
30 x 36.. 15.50 per doz.
30 x 40.. 20.15 per doz.
36 x 45.. 22.60 per doz.
Full Length Sleeves $14.25 per doz. pair
Leggings, Hip Length $25.75 per doz. pair

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Minimum order 1 dozen.
ORDER BY MAIL OR PHONE TODAY
Free Sample Swatch on Request

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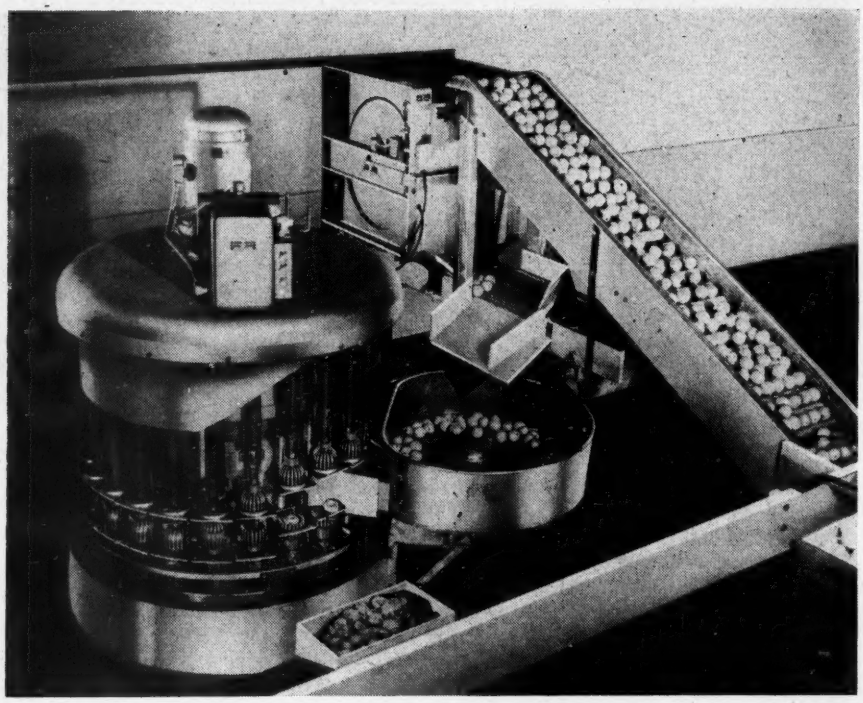

NEW ORANGE JUICE EXTRACTOR
Here is an automatic orange juice extracting machine that will handle 480 oranges per minute and is claimed capable of turning out 300 gal. of orange juice per hour, while at the same time extracting and separating the oil from the juice. The machine, designated the Super Juicer, was recently introduced by Food Machinery Corp.

performance in the field of industry; United Packinghouse Workers of America (CIO) in the field of labor; Pan-American Coffee Bureau and Win Nathanson in the field of research; and International Association of Ice Cream Manufacturers in the field of agriculture.

More Industrial Sugar Blocked by Amendment

INCREASED allotments of sugar for industrial use are effectively prevented by the Tobey amendment to the Sugar Control Extension Act of 1947. This amendment provides that rations for household use shall be increased 15 lb. per capita before industrial users will be permitted to share in any increased supplies that may be available.

Before industrial users get more sugar it will require 1,125,000 tons of sugar raw value above the amount necessary to give each citizen 15 lb. more than the 35 guaranteed by the Act. This is hardly in the cards. The most optimistic official estimate of the Cuban crop, based on March 15 figures, is 5.8 million short tons. This was made by the Office of Foreign Agricultural Relations early in April just after the Department of Agriculture took over its new duties of rationing sugar.

A change in the method of rationing sugar to producers of bulk sweetened condensed milk to a provisional allowance basis took effect April 1. This is a return to the basis in effect during the war.

Maximum prices of raw sugar has been increased 6 cents per 100 lb., and direct consumption sugar 5 cents per 100 lb., to cover a rise in ocean freight rates on raw sugars, which CCC cannot absorb under existing laws.

Sugar Rationing

A SUGAR RATIONING ADMINISTRATION within the Department of Agriculture has been established to carry out the functions assigned to the Secretary of Agriculture by the 1947 Sugar Control Extension Act.

Irvin L. Rice, of the former OPA staff, was appointed by Secretary Anderson to serve as acting administrator of the administration, with Seymour Friedman as deputy administrator. They will report to the secretary through James H. Marshall, who is to serve as advisor to the secretary of agriculture for sugar rationing and price control.

Can You Do a Tough Job?

Three $100 prizes are offered for the best articles on how to do a tough or unpleasant job. See page 117 of March FOOD INDUSTRIES for details. The contest closes on July 1. You don't have to be a good writer to win the prize, but you must be a good operating man. Just read the instructions and do your stuff.—The Editors.

The difference between "GOOD" and "BEST" in many food products is—SOY

It is literally true that you can *taste the difference* in many food products when the right amount of soy is in the formula.

There's a certain "extra something" in flavor and quality that only soy can offer—a certain something that can mean the difference between "good" and "best" in a product.

We have made a great many "before-and-after" tests with manufacturers who have asked for our help. We have been able to show them how soy works. How it improves the color of a product, and adds appetizing appearance. How it adds new richness and flavor. How it can add new quality values and greater consumer appeal.

Here, at America's Soy Headquarters, we have an experience that covers the entire food industry. Our specialists are constantly working out problems in our model bakery and industrial kitchens. Can we help *you?*

Our help is yours without cost or obligation. Let us show you what soy can do for *you.*

A. E. STALEY MFG. CO.

America's Soy Headquarters

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STALEY'S LO-FAT SOY FLOUR

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Canadian representative:
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Montreal 28, Quebec, Canada

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sanitation and germicidal materials

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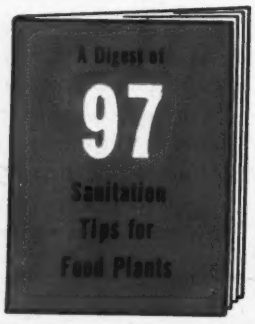
Plant Sanitation has assumed a role of major importance in safeguarding product purity. You can simplify your daily clean-up . . . put it on a low-cost basis with specialized Oakite cleaning materials and methods. They're your best bet for effective cleaning action, because they're streamlined to do away with time-consuming, back-breaking scrub and scrape methods.

START HERE! Send for a **FREE** copy of the Oakite "97" Digest and thumb through its 24 fact-packed pages for cleaning suggestions bound to help you cut cleaning time . . . meet sanitation standards with flying colors! Digest outlines step-by-step details on speeding up 97 different cleaning, sterilizing, descaling, deodorizing and related jobs . . . tips to help you safeguard product quality all along your processing line.

Your Copy— for the Asking!



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PROCESSING

Frozen Food Research Industry's First Need

E. A. MEYER, assistant administrator, PMA-USDA, in a talk before the frozen food packers convention in San Francisco, emphasized the three figures which express the "revolution" in the U. S. food industry during and since the war: (1) Per capita production up 25 percent; (2) per capita consumption up 16 percent, and (3) retail food prices up 60 percent. He pointed out the spectacular increases in production of both frozen and canned foods and suggested that the smaller consumption increase percentage behooves careful market study on the part of packers.

Mr. Meyer sees research as a matter of first importance for the industry. Research in marketing, consumer preferences, food types and varieties, best methods of processing, transporting, handling and selling. He indicated that the Research and Marketing Act of 1946 will help in this direction, when funds are made available. As to quality standards, Mr. Meyer said, "We of the department have recent inquiries from warehousemen and bankers asking if we could help them determine what frozen foods were good financial risks. They and the ultimate consumer want graded merchandise—grades which are scientifically determined and applied." Suggestions for the future were: carefully planned programs based upon market studies; efficient

Wide World

FLORIDA CLAMS

These hardshelled clams are just part of the 400 bu. brought in daily for processing at the Gordon River Plant in Naples, Fla. They are steamed, separated, minced and juiced before going into the can.

"A SMART PACKAGE MAKES A BIG DIFFERENCE!"

MR. CELLOPHANE

HERE'S A SIMPLE SOLUTION to the need for a distinctive cereal package. The protective Sylvania Cellophane bag gives maximum protection... product visibility for eye and taste appeal. Its excellent printing surface makes possible unusually attractive design.

Sylvania Cellophane has all the qualities so important in keeping foods fresh. Every step in its manufacture is constantly checked. This careful control assures not only uniform transparency and strength that will stand up under high speed wrapping operation, but the high degree of moisture vapor protection so important in food packaging.

SYLVANIA CELLOPHANE

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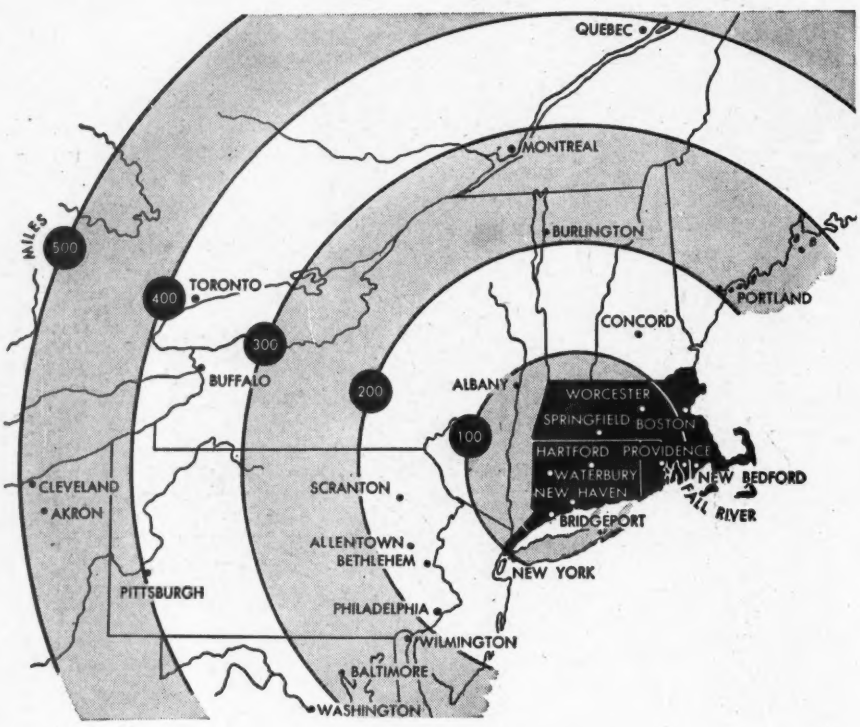
AMERICAN VISCOSE CORPORATION
Manufacturers of cellophane and other cellulose products since 1929
General Sales Office: 122 E. 42nd Street, New York 17, N. Y. *Plant:* Fredericksburg, Va.

SYLVANIA CELLOPHANE

Aiming for More Customers?



41.2% of all U. S. retail sales are made within 500 miles from the center of Southern New England!

NO MATTER where you locate on the New Haven, you'll be near a major portion of America's buying power.

38.1% of the nation's population lives within 500 miles from the center of Southern New England. This area earns 54.2% of America's industrial wages and salaries; pays 50% of individual U. S. income taxes; holds 72.4% of the country's savings deposits; bought 41.2% of all goods sold across retail counters in 1945.

Being close to this tremendous purchasing power is just one of many advantages enjoyed by industry in Southern New England.

For more facts to help you plan for future profits, write for a free copy of "SOUTHERN NEW ENGLAND FOR TOMORROW'S INDUSTRY." Address: P. E. Benjamin, Mgr., Industrial Development, New Haven Railroad, Room 201K, 80 Federal St., Boston 10, Mass.

THE **NEW HAVEN** R. R.

SERVING NEW YORK AND THE GREAT INDUSTRIAL STATES OF MASSACHUSETTS, RHODE ISLAND AND CONNECTICUT

and modernized operation; uniform quality in grade-marked packages —and a good measure of common sense.

Mason Rogers, president of the Packaging Institute, in an address entitled "The Frozen Food Package of the Future" listed package needs as "SHAC"—standardization of sizes; high speed handling; ample protection, and convenience for the customer. He observed that 70 percent of the quality frozen food packers today use some combination of bag or liner, waxed carton and overwrap such as Birds Eye began using in the early 30's.

Surely, in 15 years of packaging, greater improvement could have been made if more attention had been given the subject. He advised the industry of a new laminated sheet for large size bags; foretold the return of CRY O VAC, a "second skin" rubber product, by 1948, and suggested that the industry learn from the canning industry, investigate the part-paper, part-metal container.

Donald Barr of Young and Rubicam Advertising Agency, discussed "Merchandising Frozen Foods," largely from the standpoint of retail store merchandising—a growing field. He mentioned that mark-ups will have to be reduced by both retailer and distributor. Many distributors, he says, are even now operating at an 8 to 10 percent mark-up and making it pay.

Harlan J. Nissen, past president of the National Association of Refrigerated Warehouses stressed the need of cooperation within the frozen food industry as "not merely a matter of sentiment but an economic necessity," He also reviewed the freezer storage space situation, pointing out that this space has increased about 75 percent since 1937 over the nation.

Four Grade Standards Announced Recently

CANNED tangerine juice is now covered by U. S. standards for grades, effective April 15, superseding the tentative standards, which were effective last January 15. The standards were published in full in the Federal Register, March 15, pages 1767 to 1771.

Berries for processing are also to be covered by U. S. standards, for which a notice of proposed standards was published in the Federal Register for March 18, page 1817. The proposed standards, on which comments were to be received until early April, were to become effective May 1. They apply to "black-

FOR LEAKPROOF, TROUBLE-FREE PIPE RUNS

Cut-a-way view of a Walseal Tee showing ring of silver brazed alloy, and completed Silbraz joint.

Specify Walseal* Products

On all types of piping jobs where Type "B" copper or red brass pipe is used, trouble can be avoided by installing Silbraz* joints — made with Walseal valves, fittings and flanges.

Threadless, patented Silbraz joints are silver brazed (not soft soldered) pipe joints that are leakproof, trouble-free — permanent . . . connections that will not creep or pull apart; that literally join with the piping system to form a "one-piece pipe line". Thus, these modern joints eliminate the need for maintenance and costly repairs — especially important where lowered operating costs are imperative.

For complete details on the modern Silbraz joint, made with Walseal products, write for a copy of Walworth Circular 84.

**Patented — Reg. U. S. Patent Office.*

Recommended for

- **Hot and Cold Water Circulating Systems**
- **Boiler Feed Lines**
- **Steam Return Lines**
- **Condensate Lines**
- **Low and High Pressure Air Systems**
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Make it a "one-piece pipe line" with WALSEAL

WALWORTH

valves and fittings

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

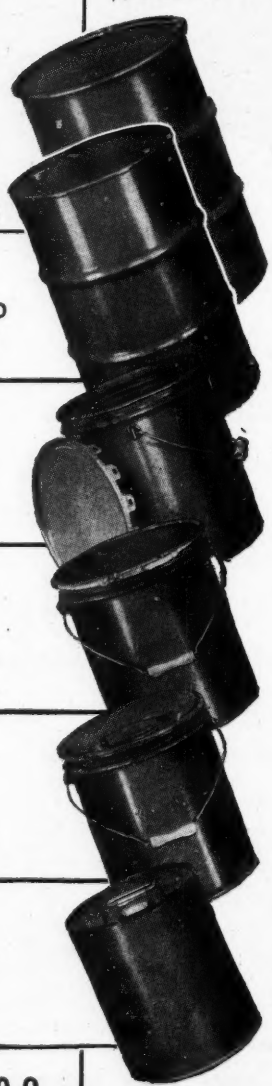
Better foods made possible by Better packaging in . . . . .

Inland Steel Containers

1. **Air tight sealing.**
2. **Positive protection from contamination.**
3. **No leakage.**
4. **No damage in shipping.**

Features of Inland Steel Containers, drums and pails, that enable producers of food products to get the finest in quality to consumers without loss of original freshness, flavor, or color.

There is an Inland Steel Container suitable for every food product.


No. 551B8 LEVER LOCKING RING DRUM
No. 5538 STANDARD SHIPPING BARREL
No. 584 LUG COVER PAIL
No. 514X LEVER LOCKING RING PAIL
No. 584R SWIVEL-SPOUT POR-PAIL
No. 594Q CLOSED TOP PAIL

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Container Specialists

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Wide World

NICE STEAK

The minority interest in this picture is a radarange cooked steak. The electronic cooker was recently demonstrated at the National Restaurant Association convention, in Chicago, preparing the steaks in less than a minute. It took longer than a minute to prepare the dish served with this steak.

berries, dewberries, Boysenberries, loganberries, youngberries, and other similar types of berries, but not raspberries."

Frozen strawberries standards, in effect since July 1, 1944, as tentative U. S. grade standards, are to be revised. Notice of the revision was published in the Federal Register for April 9, pages 2332 to 2334.

Frozen spinach, which has been covered by U. S. standards for the past three years, is the subject of another proposed revision of grade standards. The proposed revisions were published in full in the Federal Register for April 10 on pages 2367 and 2368. Comments on the revision were to be accepted until the 30th of April.

ACS Hears Reports On New Process Methods

A NEW method for preventing green olives from turning brown was reported to the American Chemical Society at its annual meeting, in Atlantic City, in mid-April. W. V. Cruess, University of California, and J. Sugihara, University of Utah, revealed that by applying heat up to 80 deg. C. the browning can be prevented entirely, and that it can be reduced by the addition of ions of fluoride, other halogen elements of cyanide.

Spoiled sirups and molasses products may be made to produce edible sugar supplies, according to the method reported by Emanuel Bloch and Richard J. Ritchie of the

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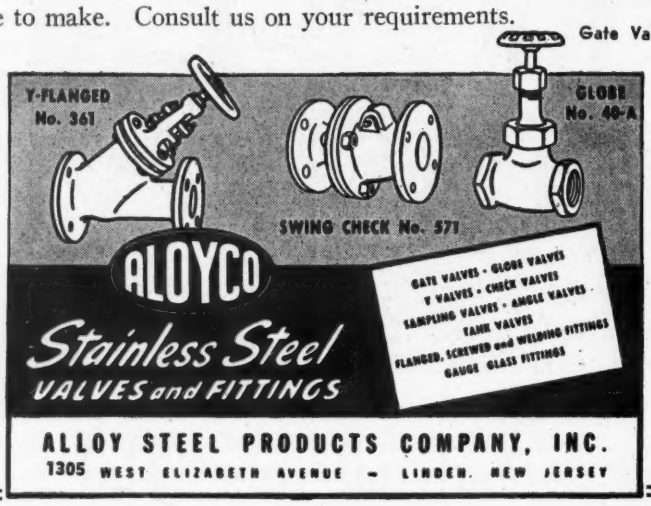
CHOOSING THE *RIGHT* VALVE IS *HALF* THE CORROSION FIGHT

Increased wage and materials costs have boosted maintenance charges greatly. That is why now, more than ever before, it pays to use enduring materials. This is particularly true of valves in pipe lines subject to corrosion or contamination. Choosing the *one right alloy* for a given application requires plenty of experience. We devote our entire engineering and production facilities to the manufacture of the best *corrosion-resistant valves* it is possible to make. Consult us on your requirements.

Gate Valve No. 111



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SODIUM BENZOATE U. S. P.

Flake ***Powdered***

Free-flowing, readily soluble

Produced by

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Pepsi-Cola Co. The new method utilizes chemically charged resins to absorb impurities from sirup and molasses. Organic acids, such as acotinic acid, valuable to the plastics industry, can also be recovered.

Bringing biochemical evidence to an old dispute, Dr. Paul Gyorgy, University of Pennsylvania, told the society that he found margarine just as nutritious as butter. As the result of a series of experiments, Dr. Gyorgy found that animal and vegetable fats "differ only insignificantly, if at all, in their nutritive value."

Conversion of sawdust, shavings, etc., into sugar for use in growing yeast cells can be accomplished at a cost that will compete with other protein sources, if the outlay for equipment is not too high, according to Elwin L. Harris, Martha L. Hannan and Ralph R. Marquardt of the USDA. About 50 per cent of the wood used can be converted into sugar, which in turn yields from 40 to 50 per cent yeast, they said. For each 100 lb. of sugar, a little more than 6 lb. of chemicals—nitrogen, phosphates and chlorides—are required. Neutralization of the sugar and addition of sulphites and oxygen, it was found, increased the yield of yeast.

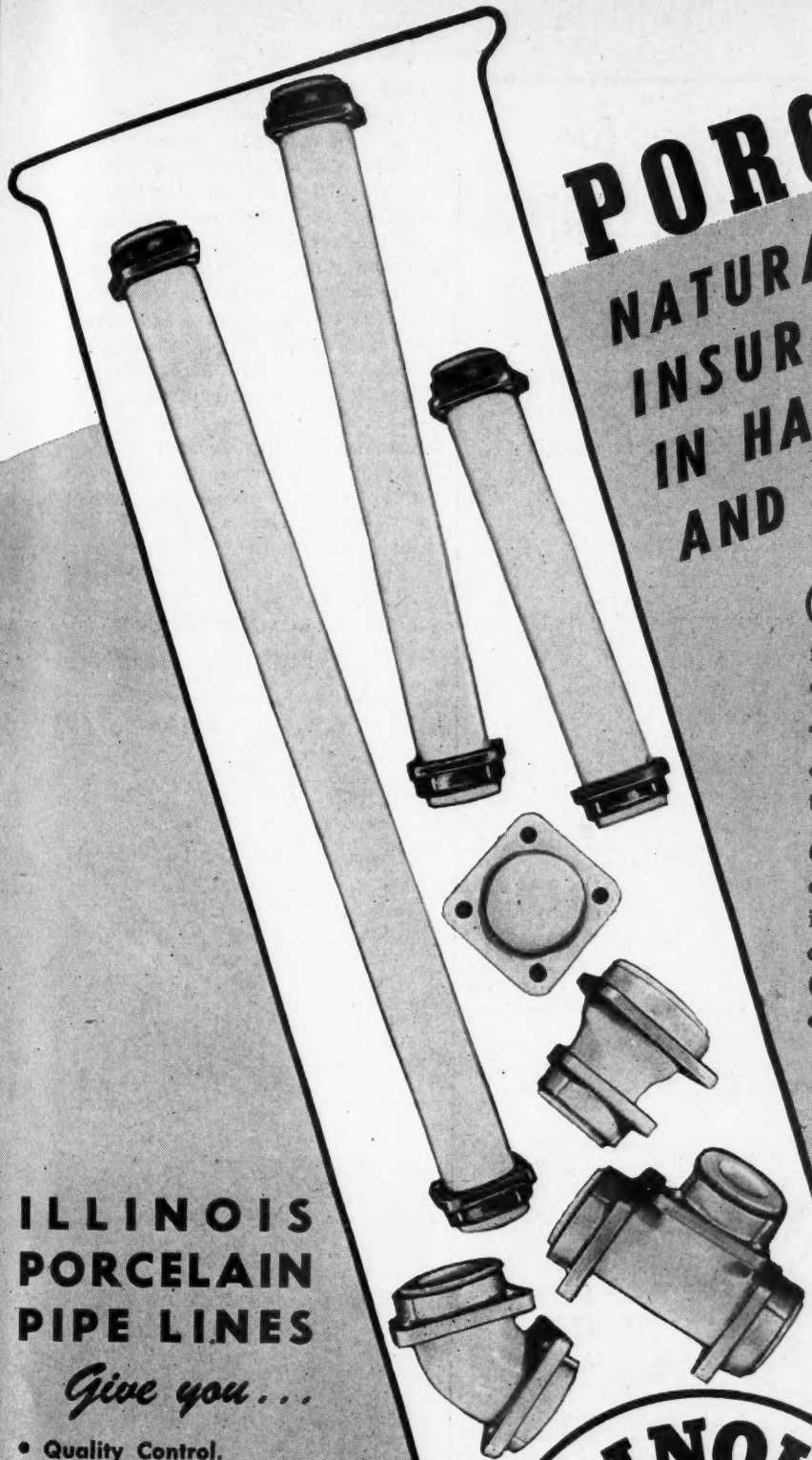
Bakery Engineers Hear Talks on Production

PANEL discussions centering on bread production, plant sanitation and infestation control, bakery equipment and its use, production of cake and sweet goods, pie making and use of flavors, formed the program of 23rd annual meeting of the American Society of Bakery Engineers in Chicago in March.

In some instances the discussions took the form of fault finding with the way existing equipment is used by plant operators as well as the way it is designed by the builders. Morris Cohen, Interstate Bakeries Corp., Kansas City, Mo., and chairman of standardization committee, cited molders to be greatly misused. Most plant operators try to do too many operations with them and do not keep them in proper adjustment and maintenance. Mixers, proof boxes, ovens, bread coolers and exhaust fans were also referred to as being abused or improperly used. Oven difficulty usually results from incorrect regulation of temperatures, of travel speed and of loading. Exhaust fans may be causing downdrafts and coolers may be delivering bread to the slicers at the

PORCELAIN

NATURAL QUALITIES INSURE SANITATION IN HANDLING LIQUIDS AND SEMI-LIQUIDS . . .



ONCE installed ILLINOIS PORCELAIN PIPE gives you a *permanent* means for *sanitarily* handling ingredient water and other liquids.

The following benefits give you an idea of what you can gain in your processing through ILLINOIS PORCELAIN PIPE.

(1) Pitting, a result of corrosion, does not occur, therefore there are no rough spots in inside walls of the pipe to accumulate or promote growth of micro-organisms. (2) Resistance to acid or alkaline waste eliminates breaks or leaks in waste disposal lines that may occur where there is corrosion. (3) Wet spots produced by water of condensation do not occur within your plant when ILLINOIS PORCELAIN PIPE is used. (4) Maintenance and replacements of ILLINOIS PORCELAIN PIPE are not required because of the permanency feature. Therefore, unsanitary conditions arising from such needs are prevented.

Catalog C-2 (SEND FOR IT) shows and describes our standard line of porcelain products. There are types and sizes to meet your specific needs. We will be glad to produce special porcelain should you need such equipment.

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Give you . . .

- **Quality Control.**
  You prevent changes occurring in water composition during its handling in the plant.
- **Production Cost Savings.**
  Cuts maintenance through elimination of corrosion. Spoilage in materials is reduced.
- **Improved Sanitation.**
  Porcelain is non-absorbent, being non-metallic, metals or minerals are not picked up by water.

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ILLINOIS ELECTRIC PORCELAIN CO.

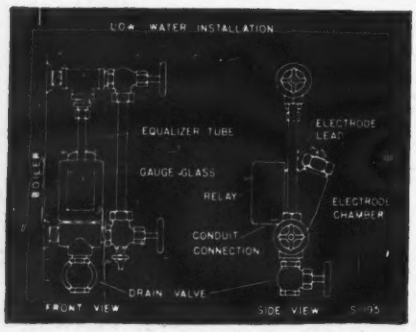
MACOMB, ILLINOIS

L-2 Series

All Electric Cutouts for

***Positive* LOW WATER CONTROL**

Designed to control any type of water from spring water to brines. Free of moving parts, glands or seals under pressure, eliminating greatest drawbacks of usual cutoffs. Large electrode area. Low current density insures freedom of spot currents.



Three types of electrode chambers and fittings available for pressures up to 150 lbs. Adaptable to all units for low water cutoff service. Low and line voltage types. Double voltage coils, permitting 115 or 230 A.C. connections.

WRITE for complete specifications on automatic temperature, pressure and flow controls.

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RANGE FROM 100 lbs. TO 5000 lbs.
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Adaptable - Fast - Efficient!

ALL PURPOSE MIXERS For WET and DRY Mixing

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No matter what your mixing problem, the Do-All will help you solve it. Built for extra long life they have all welded steel construction, ball bearings, chain drive. They are fast, efficient and require a minimum of horsepower. Also, steam jacketed cooker-mixers that reduce cooking time one-third, increase production and moisture absorption. All machines available for **Immediate Shipment.** For complete details and booklet, mail coupon below today.

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wrong temperature.

Plastic coatings for pans and troughs to eliminate greasing were discussed adversely on the basis of loss during nesting of pans and scraping of troughs. Objections may be overcome by using pans of recommended design and by revising practice of scraping troughs.

Newly elected officers are: President, J. M. Albright, Marshall Field & Co., Chicago; first vice president, Otto Richter, Richter Baking Co., San Antonio, Texas; second vice president, Jerome H. Debs, Chicago Metallic Manufacturing Co., Chicago; secretary-treasurer (reelected), Victor E. Marx, American Dry Milk Institute, Inc., Chicago.

Ask Standard Changes For Canned Fruits

AMENDMENT of the canned fruits and canned fruit cocktail standards has been requested by Flotill Products, Inc., to permit addition of rum as a seasoning ingredient. The hearing will begin at 10:00 a. m. on May 6, in Room 5544 of the Social Security Building, Washington, D. C. William W. Goodrich has been designated as presiding officer to conduct the hearing. The proposed amendments are printed in the Federal Register for March 26, Pages 1993 and 1994.

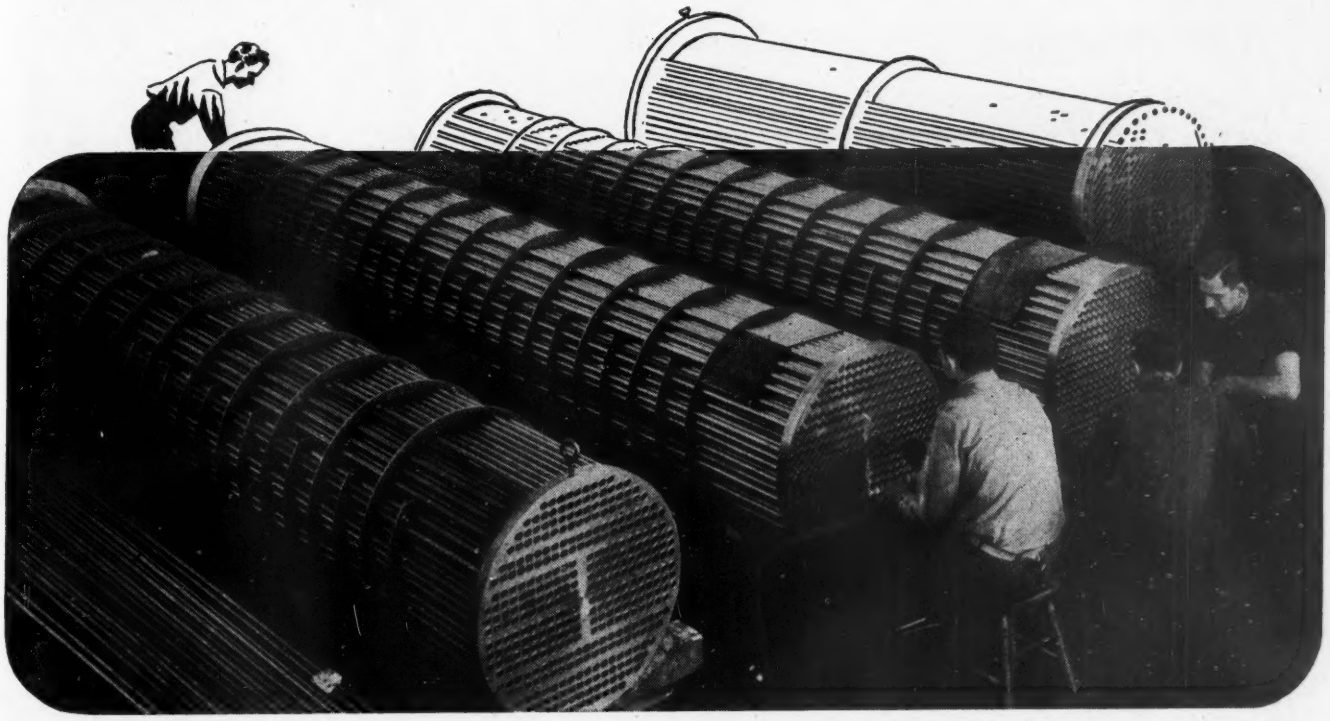
Discussions of salad dressings, canned corn, and frozen fruits at the meeting of the Food Standards

Press Association

Putting good will into Army Day, the Quartermaster Purchasing Office in New York played host to civilian guests at an army luncheon at the Hotel Astor. The 10-in-1 ration supplemented by the E ration was served to those forming the chow line. Admiral Thomas C. Kinkaid came over to show the civilians how it's done in the Navy. He is here talking with M/Sgt. H. B. Whittington, a Congressional Medal of Honor winner.

RETUBE

better — faster — cheaper



with Republic ELECTRUNITE *Heat Exchanger Tubes*

When condensers, heat exchangers or evaporators must be taken off the line for retubing, you can get them back "on stream" in a hurry—if you use *modern* Republic ELECTRUNITE Tubes.

ELECTRUNITE Tubes are different from ordinary pressure tubes, because they are made by Republic's *improved* process of electric resistance welding. They are consistently uniform in wall thickness, diameter and roundness—throughout every length and every shipment. They slide through tube sheets easily . . . roller expand smoothly and evenly . . . bead over and weld without difficulty . . . and they bend to required shapes with minimum distortion.

Just as important, from a service standpoint, are the smooth, ELECTRUNITE surfaces—free from scale and scale pits—and the rigorous hydrostatic testing inspection which assure long, trouble-free life in every ELECTRUNITE installation.

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Better than a Magic Lamp* for *Extra Help* in

SPECIAL FORMULA *DEVELOPMENT*
and *PRODUCTION* with *PACKAGING*

Without Capital Investment by you
we offer *Extra Help* as you need:

- Irregular supply or quantities insufficient to permit lowest-cost production by you;
- Production involving ingredients or facilities not suited to your regular operation;
- Centrally located production, packaging, and final shipping in one plant.

Our facilities, including laboratory control, are notably suited to difficult compounding and mixing to exact standards. Complete manufacturing service from buying through final shipping, or any single service you choose. Term or "batch" contracts.

***Responsible Inquiries Invited**

Write in confidence; tell us what type of materials would be used, approximate quantity of finished product required, package-size and services desired. We will report promptly with quotations.

Central PRODUCTS CO.
Special Formula Mixing Since 1909
214 W. OHIO ST. • CHICAGO 10

Wide World

THE OLD MILLER

A lot of Maryland water has run down the millrace since 1893, when E. E. Millard started grinding wheat at Mason Springs. The mill was built in 1732 and the stone burrs are still in evidence. Mr. Millard installed rollers a while back (50 years) and his flour has been passing through six sets ever since.

Committee late in March brought out industry comments in the case of corn and fruits, which implied that information on these commodities is still inadequate to consider these commodities at formal standards hearings. Recommendations of the Food Standards Committee on these commodities go to the commissioner of Food and Drug Administration without being made public. The next move will be an announcement of formal hearings to be held on whichever of these commodities F. & D. A. feels that such a move should be made. Such announcements will be in the Federal Register as usual.

RAW MATERIALS

Planting Stays High Despite Market Block

CANNERS are moving cautiously in a confused price situation. Costs are still working slowly upward and distributors of canned goods are placing more emphasis on quality with no disposition to make future contracts. Most canners, according to trade reports, are facing the uncomfortable position of entering the packing season without much of their future production sold.

This seems to have had little effect, however, upon the intentions to plant. Figures so far released by the Dept. of Agriculture indicate that in spite of some very substantial carryovers the acreage planted in the coming season will

How to Fatten Up Lean Profit Margins

WHATEVER YOUR PRODUCT, handling is an added cost that reduces the margin of profit . . . and the cost of handling is determined by the method of handling.

Modern handling methods mean lower handling costs—and elimination of production delays, reduced accident rates and less product damage. Modern handling methods call for Towmotor Fork Lift Trucks and Accessories—designed for fast, systematic movement of materials and products in receiving, processing, storage and distribution.

Like to fatten up those lean profit margins? You can . . . a Pocket Catalog will show you how Towmotor can help. Towmotor Corporation, Division 14, 1226 East 152nd Street, Cleveland 10, Ohio.

SEND FOR SPECIAL BULLETINS DESCRIBING THE **TOWMOTOR** • REVOLVING CARRIAGE • SIDE SHIFTER UNLOADER • UPENDER • SCOOP • CRANE ARM • EXTENSION FORKS • EXTENSION BACKREST • RAM • OVERHEAD GUARD

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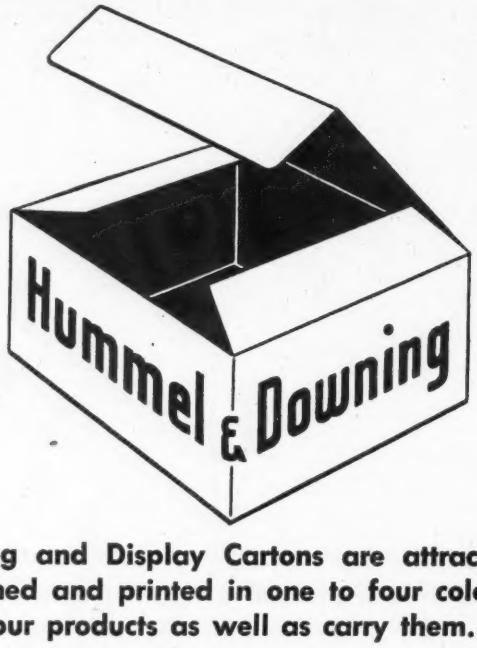
FORK LIFT TRUCKS *and* TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION



Folding and Display Cartons are attractively designed and printed in one to four colors to sell your products as well as carry them.

Hummel & Downing shipping cases of Solid Fibre, Corrugated, or Cleated Fibre give dependable protection.

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Something New Under the Sun

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IT THICKENS...
IT GELS...
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We are now producing from Carragheen two new improved types of gelose. One of them should be the answer to your emulsifying, suspending, thickening or stabilizing problems.

KRIM-KO GEL is an all-purpose colloid-assistant. Properly used, it has been proved effective in many of the most exacting food, pharmaceutical and industrial applications.

CARRAGAR is an agar-type gelatin which forms tender, fruit-like gels over a wide pH range. It does not require acidulation to produce desired results.

Send for free liberal working samples for experimental use.

approach that of last year and will exceed the Department's recommendations. Canners seem to be contracting for raw materials at about the same rate as last year and apparently will depend upon their own insistence for delivery by growers of nothing but the better quality stuff to hold down the size of the pack and to prevent the production of lower grades which cannot be handled profitably.

Spice Supply Better Except for Pepper

WITH the exception of pepper, the supply of spices is improving and will give processors little or no trouble this year.

Pepper, while temporarily in an easier position, will not be available in quantities to meet all requirements in this country for at least two years and probably three years. It will take that long for the plantations of the Dutch East Indies to be rehabilitated.

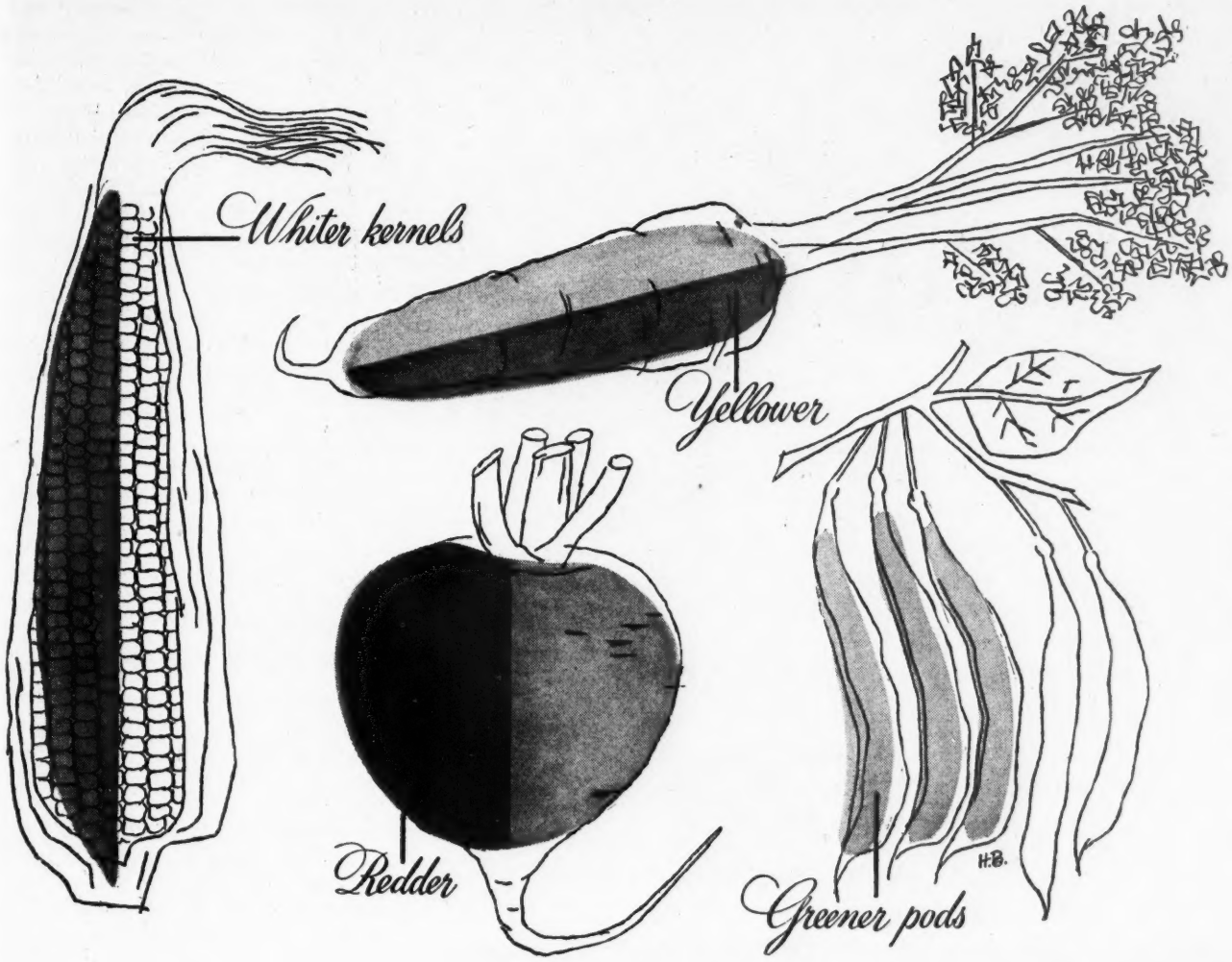
Australian Sugar Is Lowest in Four Years

MELBOURNE—The Australian Sugar Producers Association disclosed that sugar production for the current season has dived to a new low, 552,000 long tons, the lowest since 1943 (524,000 tons) and about 40 percent off the 1939 peak—927,000 tons.

Average production for the five years 1941 to 1945 was 650,000 tons and 829,000 tons for the five-year period from 1936 to 1940.

It was doubtful, the sugar men's report stated, whether the Queensland Sugar Belt had ever experienced a year of more widespread or prolonged drought than 1946. Conditions had also favored the cane grub in northern areas and severe damage was inflicted on crops by this pest.

Export and consumption figures for 1946 are not yet available. Overseas shipments in 1945 were only two-fifths of the 1939 record of 545,000 long tons, but Australian consumption established an all-time record with 456,000 long tons. Ever increasing domestic consumption in



Color, taste, and food value of canned vegetables improved by new canning process

The new process is really the combination of two well-known processes—vacuum packing and agitating.

Called "agitating-vacuum," it combines the virtues of its predecessors.

As old hands in the canning industry know, the vacuum packing of *yellow* corn has been a successful commercial process since the middle '20's. And it heightened the appearance and food value of the corn.

But the vacuum process was unsatisfactory on *white* corn, as well as beans, carrots, and beets.

As old hands too well realize, the longer processing time made the vegetables lose color.

Now about the other well-known process—agitating, or moving the cans around and around in the cooker.

Just moving the cans caused the heat of the liquid in which the vegetables were packed to cook them quicker. Processing time was *shortened.*

With these two well-known advantages of each process in mind, Canco scientists set out to combine them.

At Maywood, Illinois, where the Central Research Laboratories are located, Canco scientists carried out the fundamental experimental work which is now the basis for the new canning process—"continuous agitating and vacuum packing."

The Result?

Now *white* corn, beets, carrots, and cut green beans have a more pleasing, more natural color. They have a close approach to fresh flavor. Because less of the water-soluble vitamins are taken away by the process, they have a higher food value.

Ordinarily, such an announcement as this would be followed by a plea for new customers. Unfortunately, we can't make that plea. Steel is still in short supply. We must allocate it so that our present customers, large and small, get their proper share.

CANCO

AMERICAN CAN COMPANY · *New York · Chicago · San Francisco*

Pipe joints sealed with Key-Tite save you money for they positively will not leak. It contains no lead or lead substitutes and does not affect the taste or odor of potable liquids. Key-Tite is a perfect seal on all lines carrying water, gas, low-pressure steam, compressed air, etc. Joints are easily opened, too, for it will not freeze in the joint.

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THAT's because Cyclone makes *three* types of conveyor belts in a wide variety of metals, alloys and finishes. This extensive selection permits you to choose the type of conveyor belt that is most suitable for the operating conditions at *your* plant. The efficiency and dependability of U·S·S Cyclone conveyor belts is unsurpassed. We have been making metal belts for industry for over 25 years. Our experience is at your service. Write for free catalog No. 3. Offices in principal cities . . . factories in the Mid-West and on the Pacific Coast.

This Cyclone Chain Link Belt of stainless steel carries candy bars through a sugar-dusting process.

By the makers of Cyclone Fence

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United States Steel Export Company, New York

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UNITED STATES STEEL

spite of long-continued rationing of sugar for household use is indicative of the growing importance of fruit and jam canneries as outlets for Australia's sugar production.

An official of the Queensland Cane Growers' Council warned that the price of sugar would have to be increased if there was any serious restriction of the export market and sugar production was limited to home consumption requirements. For the past fourteen years the retail sugar price in Australia has been pegged at 4D (5½c) a lb. In recent years the profits from exports have been used to subsidize domestic consumption, both in the household and canning factory.

The official urged that Australia should do everything to hold her export quota under the International Sugar Agreement.

Jap Food Outlook Will Soon Be Known

TOKYO—The next four to six weeks will decide whether or not Japan will face a major food crisis in the coming year, according to SCAP agricultural experts.

Recently a conference of representatives from all Military Government Regions in Japan was called in Tokyo by the Natural Resources and the Economic and Scientific Sections to discuss the problem of rice collection in relation to the overall food situation.

Unless the rice collection quotas established by the Japanese government are met in April and May, Japan's 44,164,000 non-self-suppliers will not have enough food for a minimum diet, officials of the Agriculture Division of the Natural Resources Section told the assembled military government officers.

Quota collections of rice and other staple foods have been declining since the beginning of the year. To counteract this decline, the government, on March 1, announced an emergency program for stimulating rice deliveries by increasing the quantity and variety of incentive goods to be granted to farmers who fulfill or exceed their quotas.

Canned Milk Output Expands in Australia

MELBOURNE—Declining production of fresh milk and unrelieved shortage of tinplate for canning have not been able to check the continued postwar expansion of Australia's preserved milk industries.

According to figures announced in Canberra, output of condensed

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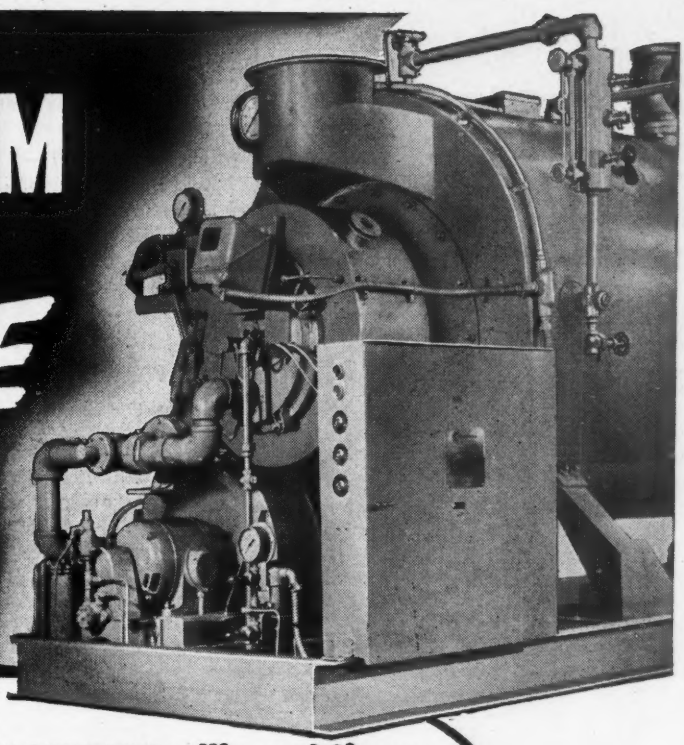
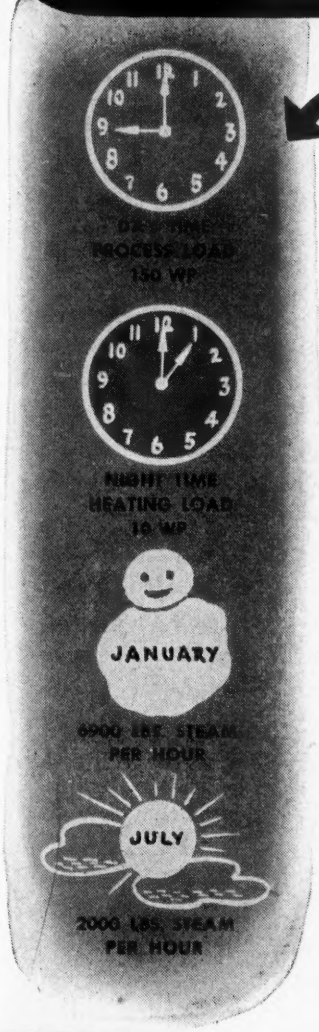
FLEXIBLE
STEAM GENERATOR





A single CYCLOTHERM will meet these varied steam demands—automatically modulating its firing rate to steam demand—A battery of CYCLOTHERMS will give you even greater flexibility

Designed to meet variable steam demands without loss of efficiency or economy

Whatever your need for steam, there is a Cyclotherm Steam Generator to do your job—dependably and economically. Sizes range from 10 to 300 HP; with operating pressures from 15 to 200 psi. If you check the features that measure value you'll see why Cyclotherm should be your 1st choice.

SIMPLIFIED DESIGN — Cyclotherm's exclusive combustion method permits simplified overall design and 2 pass boiler construction. Burner and boiler engineered as an integral unit.

PERFORMANCE — Cyclotherm provides steam automatically as you need it. Overall thermal efficiency will be not less than 80%.

ECONOMY OF OPERATION — Cyclotherm units may be fired with any liquid or gaseous fuel with maximum efficiency. Automatic modulation of flame on units 80 HP and up.

LOW UPKEEP — Unique combustion principle with 2 pass boiler assures longer life, fewer and easier inspections and "clean-outs".

INITIAL COST — Cyclotherm units are low in cost; easy and inexpensive to install. Delivered ready to produce steam; require no special foundation.

IT'S YOUR BEST BUY!

Phone, wire or write for full information

CYCLOTHERM STEAM GENERATORS

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PACKAGING PROBLEM?

If you want a simple . . . dependable . . . economical solution for your packaging problems, check with Union Special. For more than fifty years, Union Special has worked in close cooperation with makers of bags, conveyors, and bag filling and weighing equipment to produce specially designed bag closing machines that meet the needs of industry. Union Special equipment includes machines for closing bags of all types and sizes. Experience gained in handling bag closing problems in many different fields is your assurance of complete satisfaction. Ask for recommendations on your particular problems. Literature on request. UNION SPECIAL MACHINE CO., 450 N. Franklin St., Chicago, Ill.

Union Special

Bag Closing Machines

milk, both sweetened and unsweetened, during the last six months of 1946 established a new record with 26,019 tons, compared with 24,934 tons for the corresponding period of 1945. Production for the whole 1938-39 statistical year was only 15,520 tons. Canning of concentrated milk has been increasing at an even faster rate: from 1,685 tons in 1938-39 to 4,859 tons in the last six months of 1945 and 7,674 tons in the like period of last year.

Output of powdered full cream, skim and buttermilk also set a new high with 11,032 tons for the last half of 1946, which was approximately equal to production in the whole of the last prewar year.

SCHEDULE OF EVENTS

May

5–7—Millers National Federation, 45th annual convention, Edgewater Beach Hotel, Chicago.
6—National Cheese Institute, annual meeting, Hotel La Salle, Chicago.
6–10—The Society of the Plastics Industry, 2nd national plastic exposition, Coliseum, Chicago.
12–14—Biscuit and Cracker Manufacturer's Assoc., and the Independent Biscuit Manufacturers, annual convention, Drake Hotel, Chicago.
12–16—Society of American Bacteriologists, 47th annual meeting, Philadelphia.
15–17—American Society of Brewing Chemists, annual convention, Hotel New Yorker, New York.
19–23—American Association of Cereal Chemists, 32nd annual meeting, Hotel President, Kansas City, Mo.
20–22—American Oil Chemists Society, 38th annual meeting, Roosevelt Hotel, New Orleans, La.
25–29—National Confectioners Association, 64th annual convention and 21st confectionery industries exposition, Stevens Hotel, Chicago.
26–28—Flavoring Extract Manufacturers Association, annual convention, Traymore Hotel, Atlantic City, N. J.
26–28—American Society of Brewing Chemists, annual spring meeting, Hotel Roosevelt, New York.
26–29—National Confectioners Association, convention and exposition, Hotel Stevens, Chicago.

June

1–30—Dairy Month.
2–4—Institute of Food Technologists, 7th annual convention, Hotel Statler, Boston.
2–6—Association of Operative Millers, annual convention, Nicollet Hotel, Minneapolis.
8–10—Bakers Association of the Carolinas, annual convention, Grove Park Inn, Asheville, N. C.
9–10—Grocery Manufacturers of America, mid-year meeting, Skytop, Pa.
9–11—Eastern States Frozen Food Locker Association, 1st convention, Hotel New Yorker, New York.
9–11—American Society of Refrigerating Engineers, 34th spring meeting, Hotel Alexandria, Los Angeles.
15–18—National Candy Wholesalers Assoc., 2nd annual convention, Sherman Hotel, Chicago.
15–19—National Dairy Council, annual summer conference, Edgewater Beach Hotel, Chicago.
16–19—American Society of Mechanical Engineers, semi-annual meeting, Stevens Hotel, Chicago.

July

20–23—Southern Wholesale Confectioners Association, annual convention, Hotel Roanoke, Roanoke, Va.
20–26—Fourth International Congress for Microbiology, Copenhagen, Denmark.

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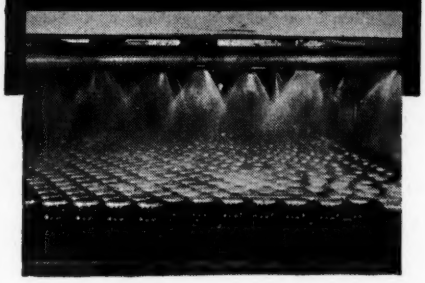
POSITIVE AUTOMATIC CONTROL OF PASTEURIZATION

with the **VORTEX**



Vortex pasteurizers assure positive, accurate control of temperature and time, plus the advantage of completely automatic operation.

Thermal transfer is achieved through the medium of atomized water sprays, and temperature zones are designed with careful attention to heat reclamation so that consumption of steam is as economical as possible. Other design features include the patented "walking beam" conveyor, smooth hydraulic drive and a complete absence of gears, cams or chains.

Years of complete satisfaction are certain because of the durability of the design and measures taken to eliminate corrosion. It will pay you to get all the facts about the advantages of VORTEX machines for either pasteurization or cooling of foods. Send us your requirements and write for new technical bulletin.

BARRY-WEHMILLER MACHINERY CO.
1946 . . . Our 61st Anniversary
St. Louis, Mo., U. S. A.

Changes in Food Supplies

(Indicators)

Production

Creamery butter production was estimated at 91,260,000 lb., in February, a 7 percent decline from January, compared with a 5 percent decrease between the same months in 1946. Output, however, was 38 percent above production in February, 1946.

Ice cream production, in February, showed a 2 percent decline from January, reaching 37,755,000 gal. This was 7 percent below February, 1946, production, though it is 91 percent above the five-year average for the month.

American cheese, in February, is estimated at 58,855,000 lb., an increase of 6 percent over January and of 34 percent over February, 1946. The five-year average shows an increase of 3 percent between these two months.

The canned carrot pack for 1946 totaled 3,759,000 cases on a 24/2's basis, in the estimates of the National Canners Association. This was a decline of about 7 percent from the 4,048,000 cases packed in 1945. Between 1937 and 1940 the canned carrot pack averaged 1,075,000 cases, basis 24/2's.

Canned and glass packed beets, produced in 1946, reached 7,044,000 cases on the 24/2's basis. The National Canners Association estimates this to be 23 percent under the 1945 output, which came to 9,149,000 cases. The 1936-1940 average was 2,973,000 cases.

The tomato catsup pack, in the 1946-47 season, reached 15,751,162 actual cases, in the compilation of the National Canners Association. This compares with 11,484,022 cases during the previous season, and exceeds the previous record pack by about 35 percent.

Poultry canned or used in canning, during February, totaled 7,423,000 lb., 36 percent less than used in February, 1946. This amount consisted of 7,160,000 lb. of chicken and 263,000 lb. of turkey. It was the smallest February quantity in the five-year record.

Lard production, in February, dropped to 162,046,000 lb., which compares with the January output of 199,206,000 lb.

Liquid egg production, during February, totaled 79,049,000 lb., compared with 72,680,000 lb. produced in February, 1946. Dried egg production for the same periods was 12,649,000 lb. and 8,362,000 lb. respectively. Frozen eggs came to 34,323,000 lb. in February, compared with 46,383,000 lb. in February, 1946.

Materials

Citrus production for the year is now forecast at 192,000,000 boxes. This is 5 percent above last season's crop and 44 percent above the ten-year average.

Spinach plantings indicate an approximate 26 percent drop in 1947 production, the estimated output being 42,110 tons. This compares with 56,600 tons grown in 1946 and the ten-year average of 44,060 tons.

Green peas for processing should total about 422,400 tons in 1947, according to early estimates. This would compare with the 517,290 tons produced for this purpose in 1946.

Storage

Cooler occupancy declined 3 percent in February and on March 1 stood at 62 percent.

Freezer occupancy also dropped, the holdings on March 1 being 82 percent, a 2 percent decline.

Frozen fish and shellfish holdings were reduced to 97,939,447 lb., on March 1, which compares with 127,118,993 lb., held on February 1, and 99,050,594 in storage on March 1, 1946.

Indexes

Business Week's index of business activity dropped to 191.6 for the week ending April 12. It stood at 194.5 for the preceding week, but was at 191.2 a month ago. A year ago this index was down to 166.9, only a little higher than the average for 1941, which was 162.2.

CONSTRUCTION NEWS

	Pending (thousands)	Total —Awarded— April (thousands)	1947 (thousands)
Bakery	$ 674	$ 60	$ 4,288
Beverages	1,297	....	2,219
Canning and Preserving	461	130	410
Cold Storage	1,305	205	1,456
Confectionery	100	....	514
Grain Mill Products	1,355	16,248	18,205
Ice, Manufactured.	....	....	55
Meats and Meat Products	448	445	928
Milk Products	1,137	286	2,297
Miscellaneous	3,097	1,000	4,276
	$9,874	$18,374	$34,648

Metso keeps pace with fast cleaning. It also insures thorough cleaning. Dirt films break down promptly, proteins are removed, and fats and oils saponified or emulsified.

Metso Cleaners are convenient to use . . . free-flowing, readily soluble in either hot or cold water; no irritating fumes. Metso Cleaners are a scientifically balanced combination of alkali and soluble silica. The soluble silica content increases cleaning action and curbs corrosion of sensitive metals.

Metso's fast action is right for high pressure cleaning. Use also for all hand cleaning. Ask for samples today.

PHILADELPHIA QUARTZ COMPANY

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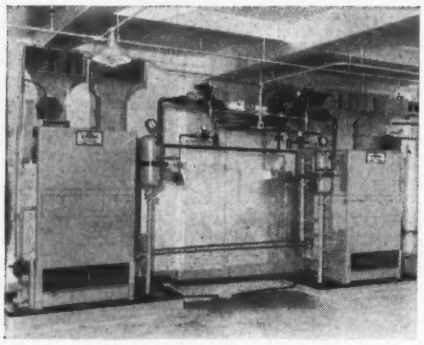
NIAGARA "NO FROST" METHOD of Refrigeration

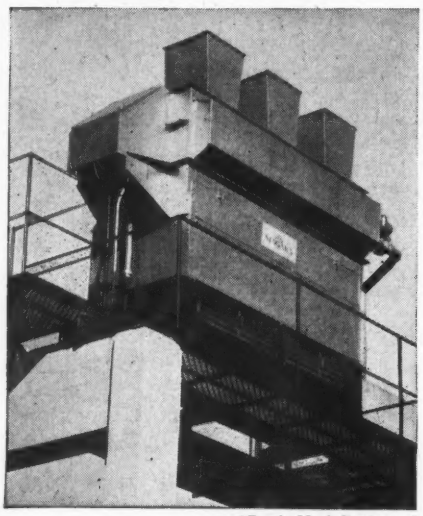


With the NIAGARA "NO FROST" Method you always have full capacity with never any refrigeration loss from frosted coils.

Write for Bulletin 83-FI and 95-FI

NIAGARA *AEROPASS CONDENSER

With Oilout, Duo-Pass and Balanced Wet Bulb Control



**Trade-Mark Registered*

Increases refrigeration capacity and plant production. Saves power and water consumption. Essential exclusive features:

1. "Balanced Wet Bulb Control" holds compressor head pressure at the minimum—saving power.
2. "Oilout" prevents oil accumulation in refrigerant—assuring full capacity.
3. "Duo-Pass" precooling coil eliminates scaling of condenser coils—assures uninterrupted service at full capacity.

Write for Bulletin 101-FI

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

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Field Engineering Offices in Principal Cities

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AIR ENGINEERING EQUIPMENT

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

BIG INCOME—Farm income in the first four months of 1947 was about $7,500,000,000, or 22 percent above the previous year. Some of the increase is caused by higher unit prices, with which purchasing agents of food companies are already painfully acquainted. But the gross marketing of agricultural products continues at record high levels. Economists wonder when the well-paid American will have to stop eating, or reduce higher-cost food consumption, because of inflated prices.

TOO LITTLE WATER—Both surface and ground water supply in some areas of the United States has been gradually declining. Government geologists are worried. Food technologists ought to investigate conditions in their plant areas if there is any suspicion that water supply for current urban or industrial use may become dangerously low in the near future. Shortage takes various forms in different neighborhoods. Sometimes it is a quantity decline of surface runoff, elsewhere a lowering of the water table in the ground, frequently pollution reduces usable quantities, and in recent years upstream users sometimes raise the temperature of a whole river to a point that cooling water at suitable temperature can no longer be taken from it. Any such factor can be very serious if not adequately anticipated and offset.

"DEAD HAND" RULE—Expiration of war powers over certain foods ended officially on March 31, or earlier, but continues through postwar authority rulings. One startling example continued the effect of price control over cheddar cheese set aside for the government until March 24, 1947, although nominally price control ended July 1, the year before. Competent lawyers question whether the government could enforce such perpetuation of terminated powers against vigorous legal contest by companies. But officials count on the fact that they can greatly embarrass a company that does not "cooperate." Thus they get away with rulings of very dubious legality. And the end has not yet been reached for all of these.

FEW TECHNOLOGISTS—Organization of advisory committees has been in progress actively in the Department of Agriculture under the "Research and Marketing Act of 1946." But it is noticeable that very, very few technologists have been appointed on any of these commodity committees. Inquiry at the department discloses the fact that the plans contemplate almost exclusively marketing and economic studies, which is not what many read in important portions of the law when Congress passed it.

WHAT IS "NORMAL"—Shipment of grain abroad has stirred a hot dispute about Washington as to whether this country can spare so much grain from its reserves this year. Obviously the quantity remaining to carry over from this consuming season to the next is far below what was formerly considered a proper "ever normal granary." But much grain is going abroad; and official Washington prays that Nature will not be too unkind in weather in the wheat areas. A short crop this year certainly would cause consternation in Washington quarters. Prospective plantings estimated recently are for about 99 percent as much spring wheat this year as last. Durum wheat is expected to be 110 percent of last year's planting.

TOO BIG TO USE—Food companies wanting factory space ought to look at the government "white elephant" plants. These are wartime establishments now surplus, which are too big to be used by a single postwar occupant. A number of them are being very successfully developed for industrial purposes by multiple tenancy. A group of would-be users secure contracts from War Assets Administration. These permit effective joint handling of power plant, trackage, and other general facilities. Thus an

CHANGE OF ADDRESS

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establishment too big for one may be economically adapted to group service without sacrifice of independence of individual enterprise.

Perhaps some food technologists know of these white elephants that could be cut up to make workable establishments. If so, WAA will be glad to attempt to work out a program, even to the extent of trying to find co-tenants for those who want part but not all of a surplus property.

TAX VS. DEBT—Competing political factions in Congress still argue as to whether economy should produce cuts in taxes or payments on the public debt. Actually neither Republicans nor Democrats want to make a decision on that controversy. But each party, and each faction of each party, wants to prove that the other fellow has done the wrong thing. Meantime the food industries stand by hopefully wishing for a tax relief handout.

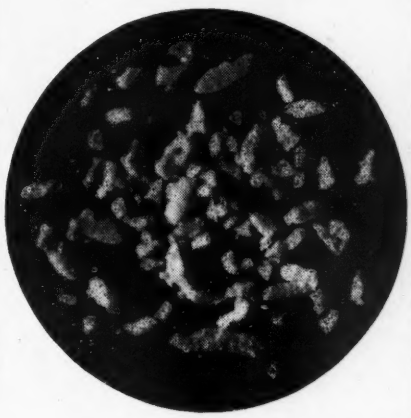
ANTI ECONOMY—Members of the appropriation committees of Congress are finding how deeply entrenched the bureaucrats have become in the easy spending days of past administrations. Everytime a cut in bureau appropriations is proposed there comes a terrific uproar about "duty to the public" or the "penny-wise policy," principally inspired by clever semi-secret propaganda from the bureau threatened. In some cases industry executives, even professional men, have fallen for this propaganda and are making it extremely difficult to adjust federal budgets downward. Sincere Congressmen wish that informed industry and individuals would limit their support to projects of intrinsic value, and not to cases intended primarily to curry favor or perpetuate clever bureaucracy.

"SKYROCKETING CORN" — Official Washington observes with deep concern recent large price increases in industrial alcohol. When one firm announced its new base price of 98 cents per gallon it blamed "skyrocketing corn prices and the high cost and small supply of molasses." Much as it would like to do otherwise, official Washington sees no way in which to promise either more molasses or cheaper corn. Very high prices for fermentation alcohol appear to be with us for a long time to come.

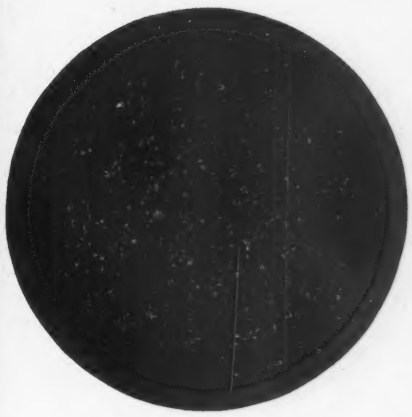
IMPORT SALES—Uncle Sam is retaining control of the sale in the United States of all goods brought here from Germany, Japan, and other occupied areas. A sincere and strenuous effort is being made currently to bring in any such goods that can be spared by those areas for sale through U. S. Commercial Company. Firms interested in raw material imports for food processing should consult that subsidiary of Reconstruction Finance Corporation, as it remains the sole selling agent for controlling imports of this sort.

MONSANTO SODIUM BENZOATE, U.S.P.

flakes



powder



flakes do not dust or ball

In the food processing and bottling fields, both powder and flake forms of Monsanto Sodium Benzoate, U.S.P., are equally recognized for high product purity. However, flakes are frequently preferred because they do not lump or ball and therefore flow more freely and evenly than powder. This results in less dust, easier handling and blending for uniform results.

Try Monsanto Sodium Benzoate, U.S.P., flakes and see if you prefer them from a use standpoint. For comparative purposes, samples of both flakes and powder will be sent on request. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri . . . District Sales Offices: New York, Chicago, Boston, Detroit, Birmingham, Charlotte, Cleveland, Cincinnati, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Ltd., Montreal.

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IN THE FOOD INDUSTRIES, PROTECTION AGAINST INFECTION IS MOST IMPORTANT!
Why not see that your employees are made familiar with this new antiseptic and safeguarded with an ample supply in your dispensary.

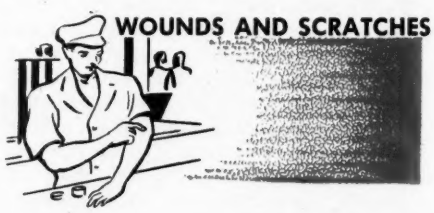
First Aid Be Prepared!

Vodine

with quick, efficient and

PLEASANT PROTECTION AGAINST INFECTION FROM

CUTS AND ABRASIONS



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MINOR SURFACE BURNS

INSECT BITES AND STINGS

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Iodine ANTISEPTIC OINTMENT

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For Easy External Application

The efficiency of iodine for application to minor wounds, burns, cuts, bruises, etc., is well known. Now—VODINE Ointment makes it easy and pleasant. In VODINE the Iodine is combined with SOLUBASE, a mild, non-irritating ointment that makes complete contact with affected areas. Practically non-staining. VODINE acts rapidly — brings quick relief, and *dependable protection from infection!* Should be in every first aid cabinet.

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Have your company doctor send for Physician's Brochure.

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MEN • JOBS • COMPANIES

INDUSTRY

American Royal Candies, Inc., Los Angeles, has taken over Green Garden Confections. Marvin Spitz is president of the new corporation.

Beech Nut Packing Co., Canajoharie, N. Y., has announced the appointment of O. R. Kamper as assistant to J. H. Surridge, food products division manager of the New Jersey division.

Carr-Consolidated Biscuit Co., through its wholly-owned subsidiary, Thinshell Candies, Inc., Chicago, is undertaking a fourfold expansion of its candy making capacity to approximately 15,000,000 lb. annually on a single shift basis. Leasehold arrangements have been concluded whereby Thinshell Candies will take over the five-story building in Chicago now occupied by the Johnson Candy Co., and containing 70,000 square feet of manufacturing space. Thinshell Candies will continue under the direction of E. Wendell Brooks, vice-president and general manager.

Cherry Meat Packers, Inc., Chicago, processor of sausages and smoked meats, has purchased 72,000 sq. ft. of land in the Kenwood manufacturing district of Chicago. Plans call for the erection of a one-story 40,000 sq. ft. building with completion scheduled for some time in 1948.

Derby Foods, Inc., Chicago, has appointed A. O. Lane general sales manager for the company. For the last ten years, Mr. Lane has been in charge of the company's Peter Pan peanut butter sales. According to Derby Foods president, C. W. Beilfuss, this promotion is in line with the firm's general expansion program which includes the building of a new plant and additional manufacturing facilities in Chicago.

The Fairmont Creamery Co., Cleveland, has bought the Gold Medal Ice Cream Co. and the M. & P. Wholesale Drug Co., of Cleveland. The company plans to operate the two units at their present locations and with the same personnel.

Fritzsche Brothers, Inc., New York, has announced the election of the following new members to its board of directors: Dr. Ernest Guenther, Mr. B. F. Zimmer, Jr., and Mr. Fred H. Leonhardt. The company also announced that, following the retirement of Dr. A. Nicolaus as manager of the Clifton, N. J. factory, Dr. Darrell Althausen has been appointed to succeed him.

C. COURTNEY SEABROOK

The frozen food industry elected C. Courtney Seabrook as president of the National Association of Frozen Food Packers, at the recent conference in San Francisco. Mr. Seabrook is with Deerfield Packing Corp. at Bridgeton, N. Y.

DR. H. H. MOTTERN

H. J. Heinz Co., Pittsburgh, has appointed Dr. H. H. Mottern as its director of research. He succeeds Dr. Fred C. Blanck, who has technically retired by becoming Administrative Fellow of the Heinz Fellowship at the Mellon Institute.

Frozen Food Foundation, Inc., Syracuse, has announced the election of Charles W. Folds, Marshall Field & Co., food division, as president for the coming year. Established in 1945, the Foundation serves as a membership scientific "bureau of standards" for 57 U. S. and Canadian department stores and industrial organizations interested in merchandising frozen foods.

Megowen-Educator Food Co., Lowell, Mass., has announced the following appointments: Walter B. Reilly, director; Charles A. Armitage, treasurer; Walter E. Megowen, vice-president in charge of production; Fred J. Boelter, plant manager and Herman E. Shane, vice-president in charge of sales.

National Selected Products, Inc., New York, through its president, Chester A. Barth, has announced the purchase of the entire stock of the 6 O'Clock Foods, Inc., Norristown, Pa. The 6 O'Clock mixes will be added to the pantry mix line developed by National Selected Products. Karl Shore, previously associated with H. J. Heinz and Hecker Products, Inc., has been elected president of 6 O'Clock Foods, Inc., and will make his headquarters in Norristown.

National Soup Mix Association has reelected A. Irving Grass of I. J. Grass Noodle Co., Chicago, as president. Vice-presidents elected were Harold L. Suttle, Continental Foods, Inc., Hoboken, N. J., and Frank A. Dennehy, General Mills, Inc., Chicago. Glenn G. Hoskins, Chicago, was appointed managing director of the association.

North Carolina is opening a new milk testing laboratory in the State Agricultural Building, according to Commissioner W. Kerr Scott.

Pasier Products Co., Chicago, plans the construction of a pickling plant at Valdosta, Ga., for processing of pickles and other products grown in the area.

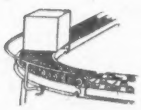
HERBERT D. McAULIFFE

Formerly assistant professor of bacteriology, Pennsylvania State College, State College, Pa., Herbert D. McAuliffe recently joined Bowman Dairy Co. as director of the research laboratory.

Careful planning by Rapids-Standard Engineers to make full use of the right combination of material handling equipment best suited to your own particular application will pay off in DEcreased costs and INcreased production. A conveyor system consisting of Rapid-Wheel Gravity Conveyors, Stevedore, Jr. Power Belt Conveyors and a Floor-Veyor was recommended by these engineers as a means of solving a complex handling problem at the McMahan & Leib Co., Anderson, Indiana. This system carries packaged goods from the loading dock to any part of a second story warehouse without man-handling . . . eliminating all overtime and demurrage costs.

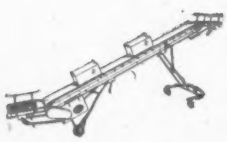
Call on these handling experts and you, too, can capitalize three ways on the three conveyors shown below:

1 RAPID-WHEEL* CONVEYOR



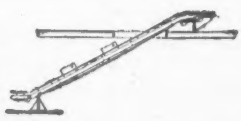
Carries your packaged material by the free force of gravity. It fits readily in narrow aisles and crowded warehouses. Quickly adjustable, and easily portable. Standard lengths 5' and 10'.

2 STEVEDORE, JR.*



A portable Power Belt Conveyor that is easily rolled to the job to save hours of man-handling in loading, unloading, stacking and elevating operations. Quickly adjustable . . . from 18" level to delivery height of 72".

3 FLOOR-VEYOR*



Permanently installed to provide a convenient method of moving cartons, cases, bags and boxes from one floor to another. It is the only unit of its type manufactured complete, ready for easy installation.

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Manufacturers of
STEEL FORGED CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

The Rapids-Standard Co., Inc.

Sales Division — 361 Peoples National Bank Bldg., Grand Rapids 2, Michigan

The Paulding Packing Co., Paulding, Ohio, has announced the sale of its plant, equipment and growers contracts to Stokely Foods, Inc., Indianapolis. The Paulding plant processes tomatoes and peas.

Shoreland Freezers, Inc., Salisbury, Md., a new concern, has announced well advanced plans for the construction of a new food processing and freezing plant in Salisbury. The company contemplates year-round operations, employing up to 100 persons. Operations are expected to begin about January 1, 1948. The majority of Shoreland's pack will be in consumer size packages under the Snow Crop label, distributed by Snow Crop Marketers, Inc., New York. Richard M. Cooley is organizer and president of the freezing concern.

Western Elevator Co., Weston, Ill., lost its elevator by fire on March 19. Loss was estimated at $300,000. Also destroyed were $220,000 worth of soybeans and oats valued at $10,000.

D. E. Winebrenner Co., Hanover, Pa., has purchased the George Smith canning plant at New Park, York County, Pa. The new owner expects to pack whole-grain corn there this season.

PERSONNEL

Clinton O. Dicken, vice-president of E. J. Brach and Sons, Chicago, recently was appointed general manager. Theodore Stempfel, the company's merchandising and advertising manager, has retired from that position, but will continue as vice-president in an advisory capacity.

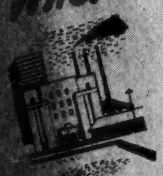
R. C. Evans has been named general manager of the Florida Citrus Commission. Formerly secretary-manager, Mr. Evans now will be responsible for carrying out the commission's policies.

Dr. George E. Felton of the Hawaiian Pineapple Co., Ltd., has been elected chairman of the Hawaiian Section of the American Chemical Society. He succeeds Dr. Hugo P. Kortschak of the Hawaiian Sugar Planters' Assoc. Experiment Station.

R. F. Fitch, head of the frozen and dried egg division of Swift & Co., Chicago, recently was elected president of the National Egg Products Assoc.

Arch F. Harter has been appointed manager of the Buffalo plant of the General Baking Co., according to an announcement by Ernest C. Von Pless, general manager of the northern New York division. Mr. Harter has been assistant manager of the

Wherever there's water, there's pH...

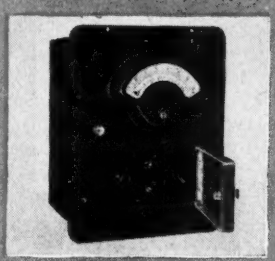


Beckman pH Control is the modern miracle tool with which industries of all types are boosting production efficiencies, reducing waste, obtaining better products at lower operating costs. No matter what *your* product or operation . . . whether metal finishing, power plant operation, agriculture, food processing, sewage and waste disposal, water supply, chemical processing, oil refining, textile manufacture—to mention only a few . . . if you use water or water solutions *anywhere*—in vats, tanks or flow lines—investigate the savings that can be made, *perhaps are already being made by your competitors*, with the aid of modern Beckman pH Control.

...and the leading name in pH is BECKMAN!

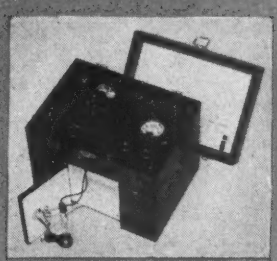
Practically every major advancement in modern glass electrode pH control has been pioneered by Beckman — the simplification of glass electrode equipment from a complicated laboratory set-up to today's practical, compact equipment . . . the introduction of completely automatic pH indication, recording and control . . . the development of High pH and High Temperature Glass Electrodes . . . these and many other Beckman-pioneered advancements make Beckman pH Equipment the most advanced obtainable.

There's a Beckman pH Instrument for every requirement

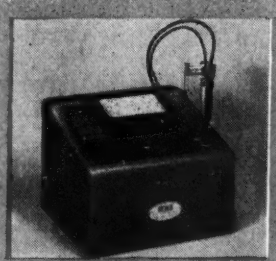


THE BECKMAN MODEL R provides completely automatic large scale process control. Operates on standard AC current. Gives continuous pH indication and operates standard recording and regulating instruments for complete and continuous pH control.

THE BECKMAN MODEL G is particularly recommended for advanced research and laboratory pH investigations. It features an unusually wide range of special glass electrodes to meet every research and laboratory requirement.



THE BECKMAN MODEL H combines compact portability with full AC operation. Recommended for industrial applications convenient to standard AC current supply. Uses standard Beckman Glass pH Electrodes.



THE BECKMAN MODEL M combines simple operation with complete portability. Its entirely self-contained power supply is a vital feature in many plant and field applications. Uses standard Beckman Glass pH Electrodes and accessories.

BRING YOUR pH PROBLEM TO US

Our trained engineers will gladly study your requirements and make recommendations on the type of equipment best suited to your particular needs. No obligation, of course.

Send for this helpful free booklet! "What Every Executive Should Know About pH" — a non-technical discussion of pH, what it is, how it's used. A copy will gladly be sent you on request.

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Newsreels grow old quickly! Fast delivery is essential, so the motion picture industry uses Air Express regularly. *Speed pays!*

With deadlines to meet, layouts and artwork must travel fast—so advertising agencies use Air Express regularly. *Speed pays!*

Raw cotton samples go abroad by International Air Express, and business transactions take *days*, not weeks. *Speed pays!*

Speed pays in your business, too!

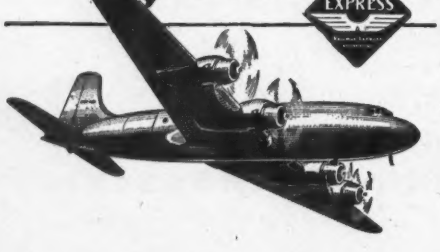
Air Express supplies the speed of delivery that's so essential in *your* business. Today, schedules are more frequent, planes are bigger and faster, and Air Express is more useful than ever. Rates are low! To send a 13-lb. shipment coast-to-coast costs only $9.58. Heavier weights—any distance—similarly inexpensive. Investigate!

- Special pick-up and delivery at no extra cost.
- Direct by air to and from principal U. S. towns and cities.
- Air-rail between 22,000 off-airline offices.
- Direct air service to and from scores of foreign countries.

AIR EXPRESS

AIR EXPRESS

GETS THERE FIRST



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plant for the past four years, having started as a junior clerk in the Buffalo office.

John D. Kelly, formerly general foreman in charge of meat canning at Libby, McNeill & Libby, Chicago, recently was appointed Chicago plant superintendent, succeeding Otto Jacobs who has been appointed assistant general superintendent of the eastern division.

Lawrence L. Lachat, senior fellow at Mellon Institute, Pittsburgh, has resigned to accept a position with the chemical research and development department, Armour and Co., Chicago.

Bryce S. Landt, Wisconsin Dells, Wis., has been renamed chairman of the administrative committee of the American Dairy Assoc. Other members of the administrative committee of the ADA are: D. T. Carlson, W. J. Swayer, W. L. Hendrix, C. R. Schoby and Dr. Robert Prior.

Lloyd Merrill is the newly elected president of the Alumni Association of the American Institute School of Baking, Chicago. He was a member of the class of September, 1924, and presently is associated with the Chicago sales office of General Mills, Inc.

Forrest A. Nutting has been appointed general manager of industrial food products for the Kraft Foods Co., Chicago, according to an announcement by G. C. Pound, executive vice-president of the company. Mr. Nutting has been with the company since 1930.

Byron T. Shaw has been appointed assistant administrator in the Agricultural Research Administration, succeeding W. V. Lambert, who was appointed administrator last October. Dr. Shaw formerly was in charge of research of soils physics in the Bureau of Plant Industry.

DEATHS

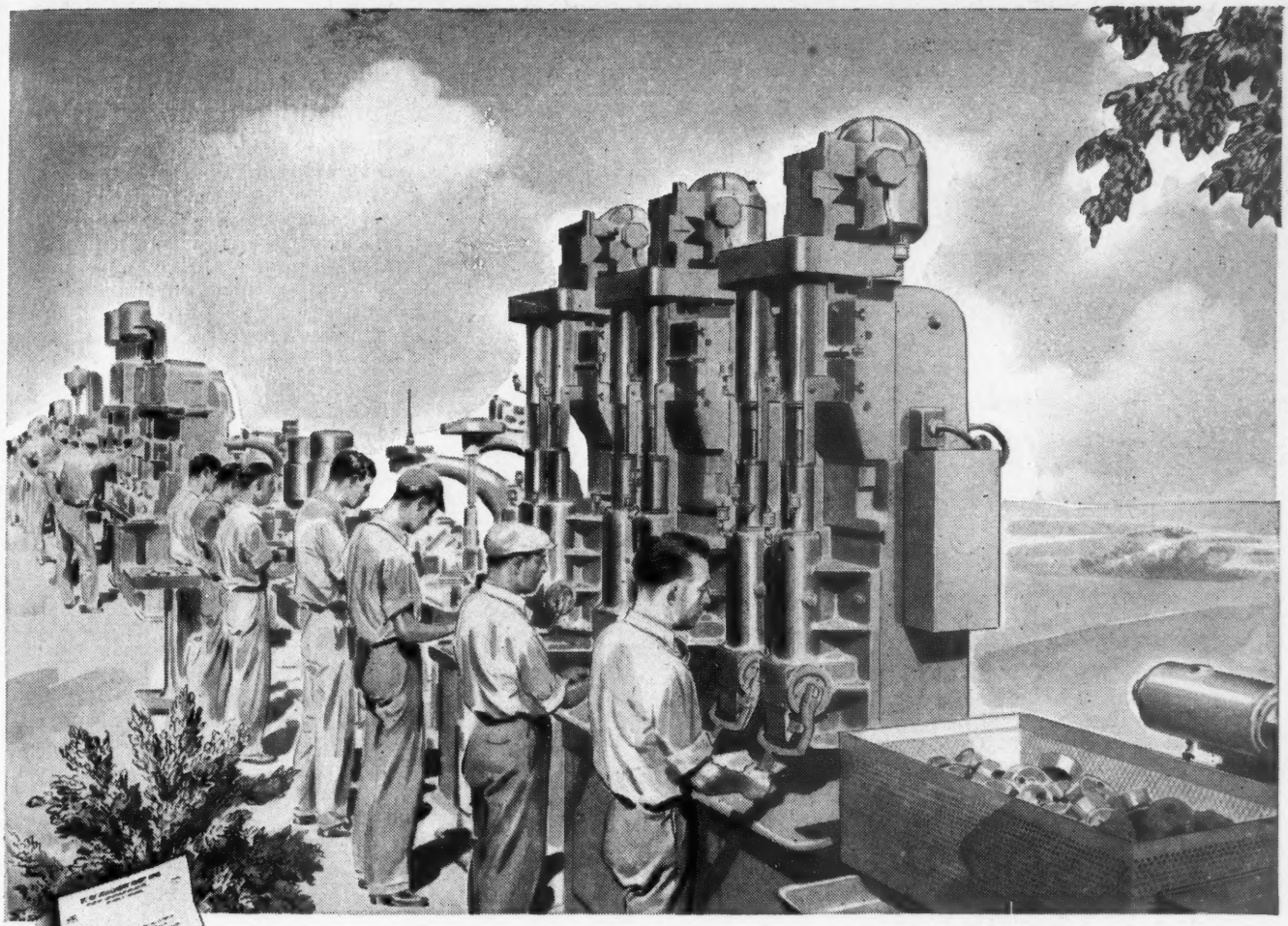
Herbert M. Bacon, chemist at Bacon Bottling Co., Hartford, Conn., West Hartford, March 19.

John Hagan, 66, former secretary, Red Rock Ginger Ale Co., Atlanta, Ga., March 5.

G. A. MacDonald, 68, vice-president in charge of sales, Quaker Oats Co., Chicago, March 4.

William Ayer McKinney, 70, president, Kitchen Art Foods Co., Chicago, March 18.

Louis E. Meyers, 78, former West Coast sales director for H. J. Heinz Co., at Los Angeles, February 24.



"Like moving your plant outdoors"

It took a lighting engineer to put into words the "lift" your workers will get from a clean, fresh coat of white paint on the ceilings and walls of your plant. Said he, in describing a job recently done in one plant with Barreled Sunlight:

"It's like moving your plant outdoors!"

He's right, too—for white ceilings and walls create an "indoor sky" which reflects and diffuses the light from your fixtures exactly as the sky reflects and diffuses natural sunlight.

This means greater lighting efficiency, *for white paint reflects far more light (80 to 90%) than paint of any other color.* And it means better seeing — the answer to greater productivity—because by distributing the light evenly it helps banish the glare, harsh shadows and extreme brightness contrasts which make seeing difficult.

But "any old white" won't do. If painting is to be a *sound investment* the white you buy must be easy to apply on large areas, give you good "yardage" without loss of hiding power and *remain* white for the longest possible time. That's why for years so many of America's leading plants have standardized on BARRELED SUNLIGHT.

U. S. GUTTA PERCHA PAINT COMPANY
378 Dudley Street, Providence 1, R. I.

I'd like to know more about the partnership of Light and Paint. Please send me your free 32-page booklet, "Light and Color in the Work-World."

COMPANY .....

STREET AND NUMBER .....

CITY ..... ZONE ..... STATE .....

MY NAME IS .....

MY TITLE .....

© 1947 U. S. Gutta Percha Paint Company

● One of the several features of Globe KANRY-TEX is its ease of complete cleansing ... a quality which you, in the food processing business, rightly require and insist upon.

KANRY-TEX is washable with live steam, hot water or sterilizing agents ... and with minimum time and effort.

But there are other points of superiority in Globe KANRY-TEX which leading canners and food processors have found of vital importance:

KANRY-TEX *does not impart odor or taste*
KANRY-TEX *resists moisture, alkali, fats, oils*
KANRY-TEX *is long-lasting and economical*

We'd like to tell you more in detail about the advantages of Globe KANRY-TEX. We're sure you'll be interested for many practical reasons. Write today to your mill-supply house ... or direct to us.

GLOBE WOVEN BELTING CO.
1403 CLINTON ST., BUFFALO 6, N. Y.

GLOBE WOVEN BELTS

ASSOCIATED INDUSTRIES

American Machine & Foundry Co., New York, has announced the appointment of Herbert C. Johnson as sales representative for the AMF Glen line of mixers for industrial use. He will represent the company in New Jersey, Pennsylvania, West Virginia, Maryland, Delaware and Washington, D. C.

Dodge & Olcott, Inc., has elected its president, F. T. Dodge, as chairman of the board. Charles A. Myers was elected to the presidency.

Food Machinery Corp., San Jose, Calif., has purchased for $861,000 the Fall Creek Ordnance Plant at Indianapolis. The plant will be occupied by the Peerless Pump Div. of Food Machinery Corp. Various types of pumps will be manufactured.

H. T. Holbrook, sales manager for Flex-Vac Division of Standard Cap & Seal Corp., New York, has been appointed chairman of the Standards and Practices Committee of the Packaging Institute. Announcement was made by Mason T. Rogers, Dewey & Almy Chemical Co., institute president.

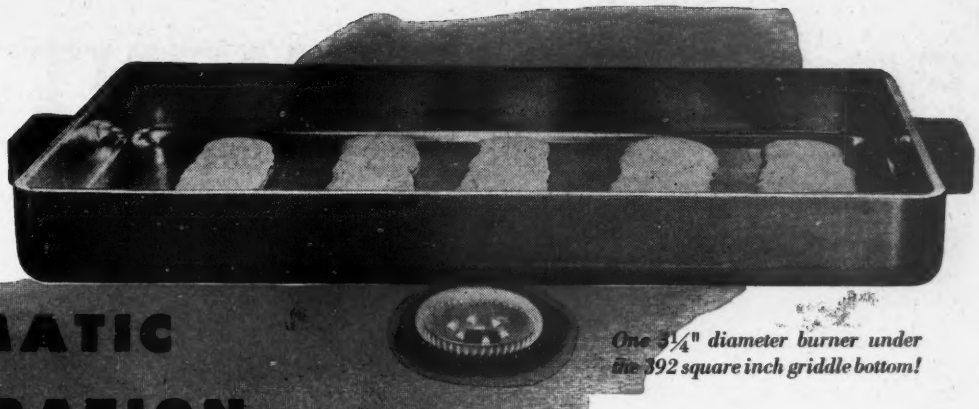
Jenkins Bros., Bridgeport, Conn., has announced the election of Alfred J. Yardley as president, succeeding his father, Farnham Yardley, who becomes chairman of the board.

The Liquid Carbonic Pacific Corp., Ltd., has announced the retirement of its president, J. A. Thomas. H. C. Mathey has been made general manager of the corporation. P. F. Lavedan, president of Liquid Carbonic Corp., the parent company, has assumed the presidency of the Pacific company.

Monsanto Chemical Co., St. Louis, Mo., has more than $22,000,000 in construction underway in its $50,000,000 program of expansion for new facilities centered on the production of new postwar products.

Gustave T. Reich, consulting chemical engineer, Philadelphia, has been awarded the contract for construction of a cholesterol plant for the American Chemical Paint Co., Ambler, Pa. Estimated cost is $400,000.

Winthrop Chemical Co., Inc., Rensselaer, N. Y., has opened a new four-story brick and glass, windowless, germ and dust-proof laboratory plant designed to be run under constant scientific control for the preparation of injectible medicines in ampuls.



One 3¼" diameter burner under the 392 square inch griddle bottom!

A DRAMATIC DEMONSTRATION OF HOW WEAR-EVER ALUMINUM *Spreads* HEAT...QUICKLY EVENLY

The Griddle Test, using the heavy duty roasting pan cover, is a dramatic demonstration of how Wear-Ever Aluminum spreads over a large area the heat from even a small source. (Of course you normally would never attempt to heat a pan of this size—21⅝" x 18⅛" x 2¼" deep—with one burner only 3¼" in diameter).

When the five pancake strips are turned, you notice how sufficient heat has been diffused throughout the Wear-Ever Aluminum to bake the strips to an appetizing, golden brown color. Because of this quick, even heating, Wear-Ever Aluminum eliminates the need of grease, thus no smoke, no odor.

NOT JUST THE BOTTOM . . . BUT THE WHOLE WEAR-EVER UTENSIL COOKS FOOD

And this holds true for all Wear-Ever Aluminum. Made of a super-hard, tough aluminum alloy, Wear-Ever equipment is highly resistant to denting and scratching . . . keeping maintenance costs to a minimum. Wear-Ever Aluminum is also friendly to food, protecting purity and flavor.

Meet your requirements with Wear-Ever Aluminum. See your supply house representative, or write: The Aluminum Cooking Utensil Company, 305 Wear-Ever Building, New Kensington, Pa.

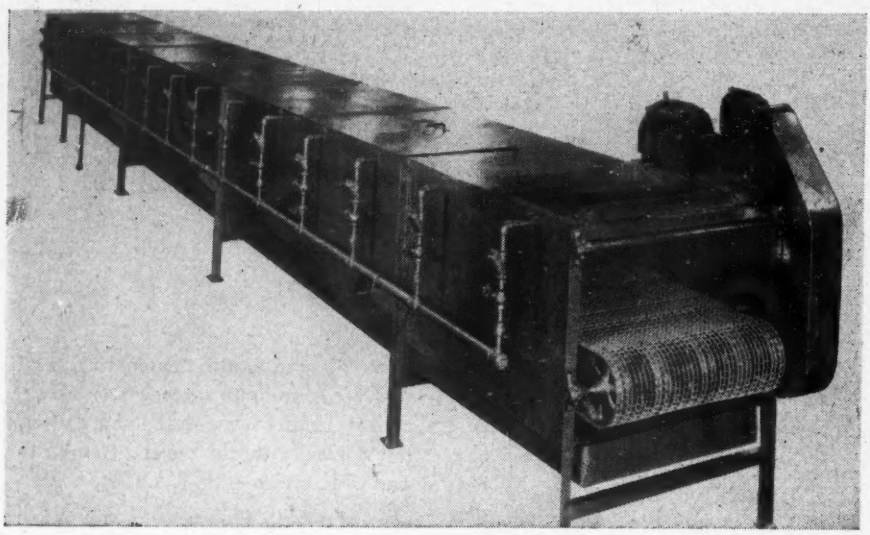
NOW . . . MORE WEAR THAN EVER IN

WEAR-EVER *Aluminum*

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF. TAC USCO

Made of the metal that cooks best . . . easy to clean

FOOD EQUIPMENT NEWS



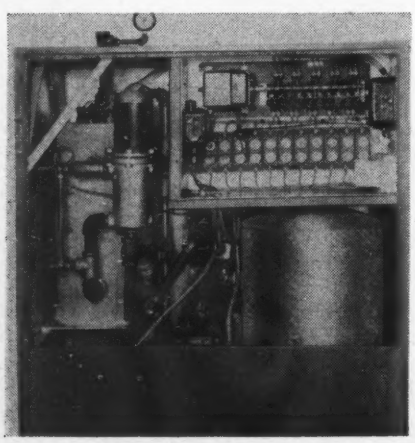
Continuous spray cooler for all size glass packages.

Continuous Cooler 1

DESIGNED to provide continuous operation and eleminate batch cooling of glass packaged foods, a spray cooler is produced by Special Machinery Div. of A. R. Farquhar Co., Dept. I, York, Pa. It is built to handle any capacity and any size container, and operates at any speed from a fraction of a ft. per min. upward. The first three spray headers are designed for use of hot water in order to temper the glass before contacting the cold water spray in the balance of the cooling unit. Hot water and cold water are caught in individual pans and reused by re-circulating pumps.

Electric Boiler 2

A SMALL, compact electric steam generator, available in capacities of 1.7, 2.9, 4.1 and 5.4 hp., at operating pressures from 5 to 100 psi., that will produce steam from a cold start in 5 to 6 min., is produced by the Cronholm Mfg. Co., Dept. I, 3500 S. E. Hawthorne Ave., Portland 15, Ore.



Package electric steam generator.

The all-copper generator has a series of copper sheathed immersion electric elements extending through it. Flow of current through the elements is controlled by modutrol. Package unit complete with pump, receiver, modulating controls, pressurestat, solenoid valve for boiler makeup and magnetrol for boiler level control requires 6 sq. ft. of floor space.

Industrial Wheels 3

A LINE of light weight industrial wheels, ranging in size from 6 to 12 in. and in load rating from 480 to 1,200 lb. is offered by Thermoid Co., Dept. I, Trenton, N. J. The wheel is made of a tough, lightweight aluminum alloy with oversized ball bearings and built-in grease seals. There is a large grease reservoir, equipped with a standard grease gun fitting. The rubber tread is smooth, cut resistant and quiet in operation.

Pan Glaze 4

A NEW silicone product, which eliminates the larding of pans used in baking bread is announced by Dow Corning Corp., Dept. I, Midland, Mich. This product, especially developed for use in the baking industry, is sprayed and baked onto the pans. One application is reported to be good for about 200 bakings during which time no grease of any kind is required. In addition to eliminating the cost of greasing pans, the quality of bread is improved. Pan glaze forms a thin film which does not turn black, smoke, melt or flake off. This silicone surface prevents the sticking of bread and results in more uniform and more evenly browned loaves.

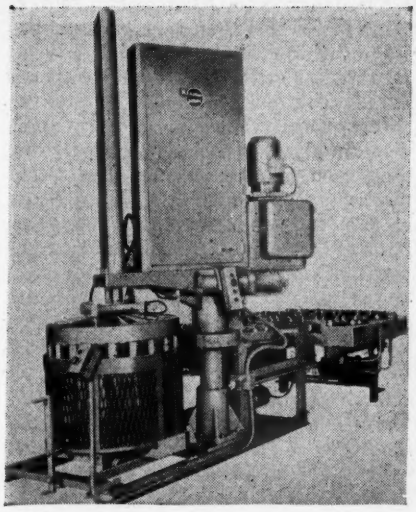
Silicone-treated pan eliminates larding.

Retort Crate Loader 5

A MACHINE to automatically load cans or jars into retort baskets has been developed by W. F. and John Barnes Co., Dept. I, 301 S. Water St., Rockford, Ill. It consists of a storage conveyor, a collecting table and a magnetic loader. Cans or jars are received from the closing line into the storage conveyor, and a pre-set number are passed onto the rotating collector disk. When the disk is filled, the waiting magnet is lowered hydraulically and picks up the con-

WRITE FOR MORE INFORMATION

Food Industries Reader Service now makes it easy for you to follow up the news on new equipment and new materials. Tear-out coupon cards are supplied for your convenience on the special colored page which follows the equipment news section in this month's issue. Enter your requests, fill out and mail cards, and let Reader Service do the rest.



Machine loads retort crate automatically.

tainers. The gate opens to permit collecting disk to become filled, while the magnet swings 145 deg. and lowers containers into empty crate. When crate is filled, the unit stops until crate is removed and an empty crate is registered in the loading position.

Defrosting Control 6

AN electronic circuit, for automatically controlling water defrosting of refrigeration coils, is announced by the Bush Mfg. Co., Dept. I, Hartford, Conn. It employs a single tube to trigger a relay that initiates all of the functions required. Called the Auto Defrost, this device is connected in series with the fan motor. It functions only when an accumulation of frost on the coil causes the fan motor to draw more current. By means of simple relay circuits, a single unit can control several refrigeration coils.

Frozen Food Case 7

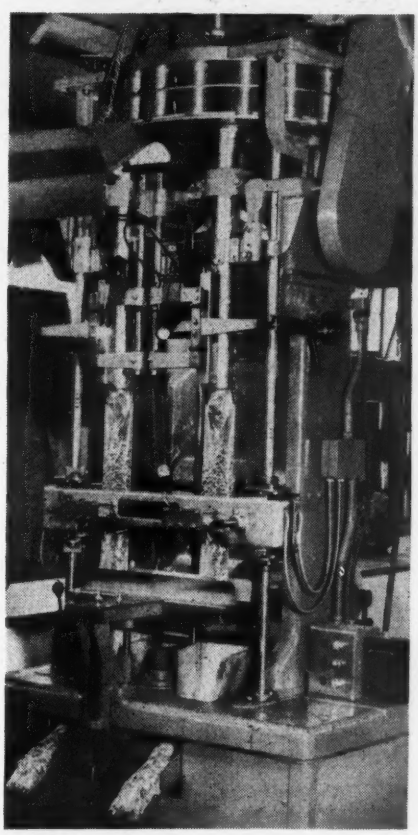
A 1947 open style self-service frozen foods display case is announced by Tyler Fixture Corp., Dept. I, Niles, Mich. Display compartment has 9 cu. ft. in the low temperature zone, and all packages are within easy reach of the customer. It has 19 cu. ft. of space in the lower storage compartment. Other advantages are: shatter-proof glass wings at both ends to prevent drafts; night cover of

Open style self-service frozen food case.

waterproof plywood with aluminum reflector on under side; porcelain display compartment and plate coils.

Packaging Frozen Food 8

AN automatic packaging machine, especially constructed for filling frozen foods into cellophane bags, heat-sealing the bags and delivering them ready for packing in the container at speeds of 40 or more per min., has been introduced by Stokes & Smith Co., Dept. I, Philadelphia 24, Pa. The machine feeds the cellophane from a roll, automatically forms the bags,

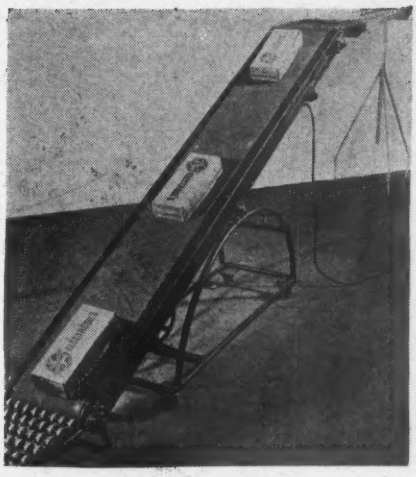


Machine packages pre-frozen foods.

fills a measured quantity of pre-frozen products into the bag and heat-seals it. Various styles and combinations of packages can be used.

Elevating Conveyor 9

A LIGHT-WEIGHT, sturdily constructed elevating conveyor, designed to load or unload, elevate or stack boxes, crates, cases, cartons and containers is announced by Speedways Conveyors, Inc., Dept. I, 1261 Niagara Street, Buffalo 13, N. Y. The belt table is mounted on a welded pipe supporting frame. All moving parts including drive spocket and motor are properly guarded. It will speedily convey material along a horizontal plane, or elevate it to a height of 6 ft. Angle of elevation is simply and easily set. Driven by a 60 cycle, 110-volt motor, it has a power-driven feeder unit that is also adjustable and reversible. The unit can be kept



Portable, light-weight elevating conveyor.

parallel to the floor and connects to conveyors with universal coupling.

Ice Cream Can Carrier 10

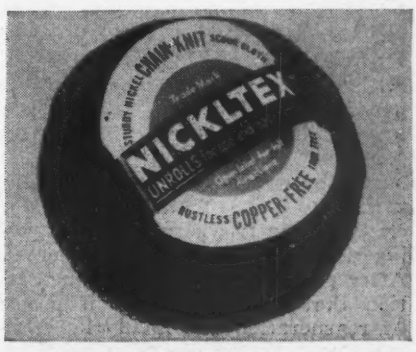
A NEW carrier for all standard sizes of paper and metal ice cream cans, that makes handling of them easier and more sanitary both in the plant and on the truck, has been introduced by Cherry-Burrell Corp., Dept. I, Chicago 6, Ill. It operates on the lever principle; the heavier the can the tighter the grip. No part of the carrier touches the ice cream, even when the lid is off the can.

Plastic Apron 11

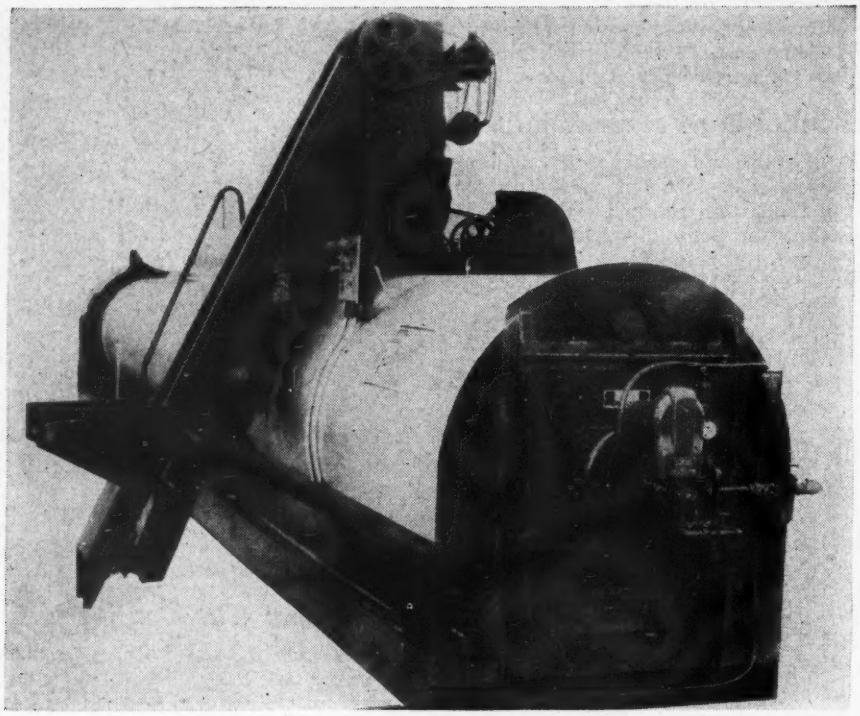
A PLASTIC eyelet has been developed to replace the customary metal grommet formerly used in Hydro-Glass all-plastic industrial aprons manufactured by Hydro-Tex Corp., Dept. I, 564 W. Adams St., Chicago 6, Ill. The plastic eyelets are fused to the apron by dielectric or radio frequency heat. Claims are advanced that they allow fastening of shoulder straps and apron strings without weakening of material by sewing, needle perforations, seams or strains. Aprons are available in several thicknesses which are resistant to oil, grease, water, most acids, alkalis and heat.

Scour Cloth 12

A NEW, all-nickel scour cloth that cleans cleaner and faster and lasts longer is made by Metal Textile Corp., Dept. I, Orange, N. J. NICKL-



Scour cloth of solid nickel wire.



Oil-fired farm-size dehydrator shreds and dries perishable farm products.

TEX, as it is called, is made of flattened solid nickel wire knitted into the cylindrical form of a sleeve without loose ends. It can be unrolled to clean tubing or rolled up to clean corners and hard to reach spots.

Humidifier 13

TECHTMANN INDUSTRIES, Dept. I, 714 W. Wisconsin Ave., Milwaukee 1, Wis., announce the development of the Humid-O-Matic steam humidifier. By merely turning the small adjustment screw at the top, it will diffuse up to 20 gal. of water in 24 hr. with 5-lb. pressure, while a larger model diffuses up to 100 gallons. The Humid-O-Matic prevents air from entering the system when steam pressure drops below atmospheric pressure point, and shuts off when condensate cannot return fast enough to prevent overflowing. Surplus condensate is returned to the supply line against higher pressure. It controls humidity at the desired percentage during heating season. Operates on 1 to 10 lb. pressure.

Electric Pasteurizer 14

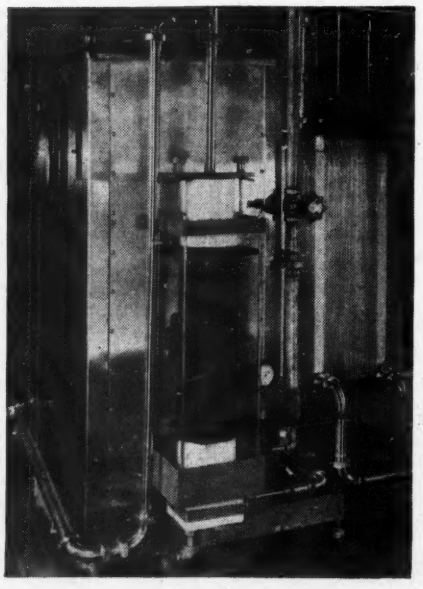
AN all-electric pasteurizer, for S.T.H.T. pasteurization of milk, is made by the Pure-Pak Division of Ex-Cell-O Corp., Dept. I, Detroit, Mich. Models offer a choice of capacities from 1,300 to 10,000 lb. per hr. Preliminary heating is by a regenerator section where raw milk is heated by the pasteurized milk. The raw milk then flows through the electrode heater where the final heating is done by electrical current. After passing through a holding section the pasteurized milk is cooled by regeneration and finally by refrigeration. A flow diversion valve insures proper temperature of milk.

Dehydrator 15

AN oil-fired, farm size dehydrator which processes anything from beets to alfalfa, and makes it possible for farmers to dry and store perishable farm feed products, is manufactured by the J. B. Beaird Co., Inc., Dept. I, Shreveport, La., and is fired by a York-Shipley industrial-type rotary oil burner. Drying is done in a long revolving cylinder through which the heat is drawn by an exhaust blower.

Jiffy Sketch Pad 16

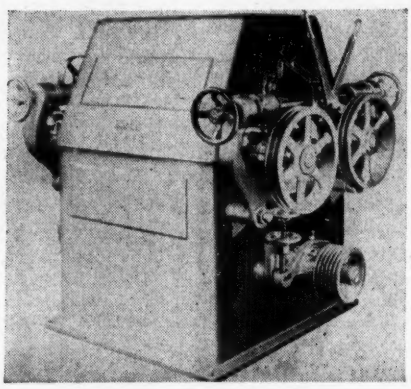
A SCALE drawing pad that enables one to make properly proportioned drawings without use of a ruler, drawing board or T-square, is made by Jiffy Sales Co., Dept. I, 1822½ E. 37th St., Cleveland 14, Ohio. The Jiffy Sketch Pad, as it is called, contains 75 sheets of high quality tracing tissue, inclosed within a cover jacket that consists of four cardboard flaps. Various scales are printed on three of the flaps. To use the pad, you simply fold back the cover flap and then place one of the tissue sheets over the scale you wish to employ. Your drawing is made accurately to scale with the aid of the printed lines which show through the tissue. Drawings made on this pad may be blue-printed. Sheets measure approximately 9 x 12 in. They are perforated for easy removal.



All-electric S.T.H.T. milk pasteurizer.

Roller Mill 17

A NEW model double roller mill which has a variety of uses in the flour, cereal and feed milling industries is announced by The Wolf Co., Dept. I, Chambersburg, Pa. Improvements provided are: a roll type feeder which automatically spreads the stock in an even stream over the entire length of the roller; three-sectional feeder housing and spout box with removable front and rear sections to facilitate cleaning or adjusting and elimination of wood.



Improved double roller mill for cereals.

Indicator Unit 18

AN indicator that tells at a glance exactly how much liquid remains in a 30 or 50-gal. steel drum is made by the U. C. Indicator Co., Dept. I, 524 E. Locust St., Milwaukee 12, Wis. Just screw the indicator into the drum faucet opening, then screw faucet into opening on indicator body, release locking device and the indicator, with pointer above the faucet, is ready for operation.

Portable Conveyor 19

A PORTABLE, motor driven conveyor, operating over 6 in. diameter grooved steel rollers at 20 in. intervals, is made by E. C. Horne Machinery Co., Dept. I, 315 E & C Building, Denver 2, Colo. It provides fast, efficient movement of merchandise in units not heavier than 200 lb., around curves up to 90 deg., and will operate at maximum incline of 12 deg. Supported by swivel castors which permit easy movement in or out of box cars or to

Patapar*

*REG. U. S. PAT. OFF.

...for protection ...for sales appeal

High wet-strength ...grease-resisting

Does your product contain fat or grease? Does it contain moisture? Most food products contain both. And for protection they need wrappers that have wet-strength and are grease-proof at the same time. Patapar Vegetable Parchment has both these qualities. It can be soaked in water for months — even boiled — and remain strong. And when it comes in contact with fats, grease or oils, Patapar resists penetration. Its outer surface keeps clean — appetizing.

Beautiful Printing

Patapar wrappers can be printed beautifully with brand names and colorful designs. We do the printing economically in our own plants which are equipped for printing Patapar in one or more colors — by letterpress or offset lithography.

When you order printed Patapar we'll gladly include the Keymark on your wrappers at no extra cost. The Keymark is the nationally advertised symbol of wrapper protection. It is a way to remind customers that your product is well protected.

Paterson Parchment Paper Company • Bristol, Pennsylvania

Headquarters for Vegetable Parchment Since 1885

WEST COAST PLANT: 340 BRYANT STREET, SAN FRANCISCO 7, CALIFORNIA

BRANCH OFFICES: 120 BROADWAY, NEW YORK 5, N. Y. • 111 WEST WASHINGTON ST., CHICAGO 2, ILL.

✓ CHECK THESE
OUTSTANDING
ADVANTAGES
OF
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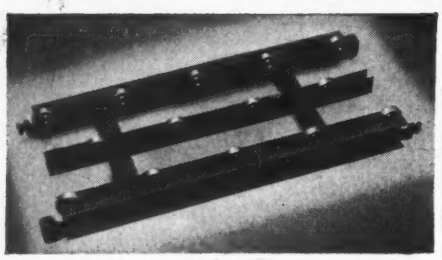
SYSTEMS



WHEEL CONVEYORS—designed specifically for your needs.

STRONGER BOX CONSTRUCTION — to assure greater load per section.

LOCKED INNER WHEEL RACE—(equipped with free-rolling ball bearing wheels) —that does not creep or cut shafts.

LOCK NUT USED THROUGHOUT—vibration cannot loosen wheels or nuts.

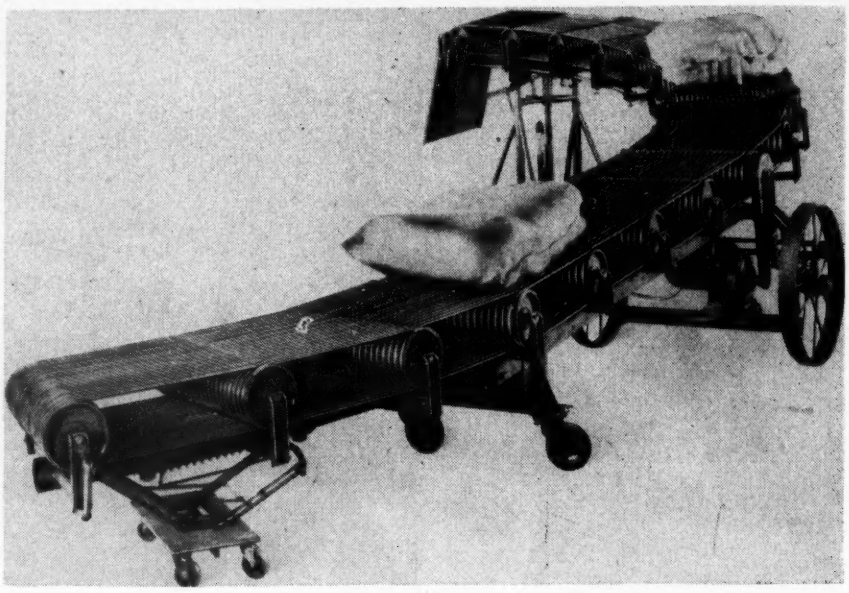
EASY TO REPAIR—no special parts or shafts. Repairs can be made in your own shop.

SPACING OF ROLLS CAN BE CHANGED QUICKLY—all flats are punched on 3" centers and additional wheels can be added as needed.

LIGHT IN WEIGHT for easy handling.

Our experience of more than 25 years' is at your service to help solve your materials handling problems. Write for detailed information.

HARRY J. FERGUSON CO.
WHEEL • PORTABLE BELT • BELT AND ROLLER GRAVITY CONVEYORS
123 WEST AVE., JENKINTOWN, PENNA.



Portable, flexible reversible conveyor.

points in plant where needed. Head end and tail end adjustable in height while unit is in operation. Length of standard machine 26 ft. 8 in. long by 20 in. wide. Capacity approximately 1500 bags per hour. Powered by 1 hp. gear motor with reversing switch through roller chain drive to middle roll of conveyor.

Thinning Spray 20

A NEW spray that, when applied two weeks after full bloom, will reduce the number of fruits per apple tree up to 50 percent is produced by B. F. Goodrich Chemical Co., Dept. I, Rose Bldg., Cleveland, Ohio. The spray is said to be non-injurious and non-caustic to both fruit and trees and eliminates the hard labor required to remove excessive and undesirable fruit before harvest. Indications show that it will be a suitable thinner for peaches also.

Pumps 21

A LINE of "Pedrifugal" pumps has been developed by the Allis-Chalmers Mfg. Co., Dept. I, Milwaukee, Wis., to meet the needs of those who require a sturdy, reliable pump of moderate capacity. The pedestal-type centrifugal pumps come in three sizes—1 in. x 1 in., 2 in. x 2 in., and 3 in x 3 in. Capacities from 10 to 500 gpm. at heads from 10 to 100 ft. with power requirements of ½ to 15 hp. They are designed for use with Texrope V-belt drives, giving an infinite range of capacities regulated by size of sheaves and power supplied. Pumps are compact and operate in any position.

Cast iron bronze-filled "Pedrifugal" pump.

Unit Cooling Tower 22

CAPACITIES from 3 to 50 tons of refrigeration are provided in a new line of unit cooling towers built in ten sizes by Marlo Coil Co., Dept. I, 6135 Manchester St., St. Louis, Mo. These units, which are a modification of the company's evaporative condenser, are identical in dimensions with the latter, and are similar in construction, except that in place of a condensing coil, suitable wetted deck surface is used. Towers are provided with mechanical draft to make their performance independent of prevailing wind direction and velocity. It is claimed that all drift and objectionable spray carry-over are prevented. Units are light in weight and sectionally built, making them suitable either for outdoor roof or indoor locations.

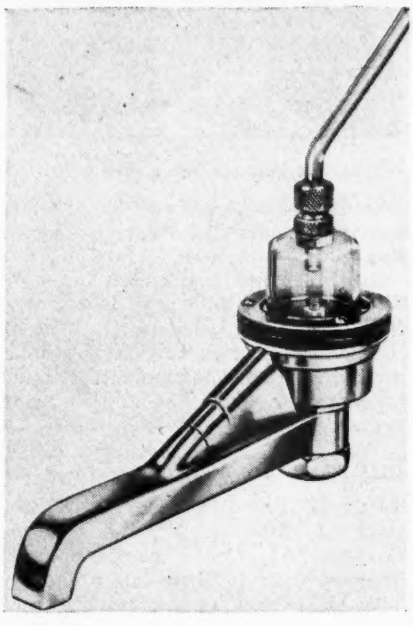
Heavy Duty Lift Truck 23

THE MERCURY MFG. CO., Dept. I, 4440 S. Halsted St., Chicago 9, Ill., has announced a new die handling assembly that is built into a Mercury "Mogul" 5-ton high lift chassis. It can also be furnished on Mercury's 3-ton chassis, in either high or low lift models. This design consists of two power driven die movers, operating in machined slots at the sides of the load platform. Each die mover is driven by a compound wound d.c. motor through a speed reducer and roller chains. Independent control is effected by two push button operated magnetic contractors. Additional con-

trols at the rear of the load platform may be had if desired. Die movers may be retracted into slots at the rear of the platform for skid handling.

Automatic Dispenser 24

A PRODUCT that eliminates the human element in sterilization of glassware and dishes is manufactured by the Solfred Mfg. Co., Dept. I, 3727 San Fernando Rd., Glendale 4, Calif. Operating as a swivel spout, Microb-Master, as it is called, releases pure water when turned on over one sink and a predesignated proportion of chlorine, quaternary, or other chemical-and-water when turned on over the other sink. A slim attractive silver-finished faucet in appearance, the swivel spout actually is a chrome-plated dispenser with a small, unbreakable, plastic bell resting atop



Automatic dispenser resists corrosion.

the faucet to prevent or release the flow of detergent as the spout is swung from one sink to the other. With all interior parts hand-dipped in Neoprene for corrosion-resistance, the swivel spout will operate under all conditions arising from the use of rapidly oxidizing chemicals.

Wrapping Machine 25

A SINGLE machine that can wrap cakes, turnovers, cookies and small pies without major changes or adjustments is manufactured by Battle Creek Bread Wrapping Machine Co., Dept. I, Battle Creek, Mich. It will handle packages of all shapes and sizes, or even a group of loose items assembled on a card. Its great flexibility is reflected in its quick adaptation from an end fold operation to an underneath fold where desired. An electric eye may be used to register all printed papers carefully to make a trim, neat appearing pack-

FACTS FOOD PROCESSORS SHOULD KNOW ABOUT

PlasTex

The Plastic Coated Food Belting

1 PlasTex *is not* a rubber, synthetic rubber or nitro-cellulose compound coated belting, and should not be confused with these. There is *only one* PlasTex Belting.

2 PlasTex is a specially developed plastic coating that is impervious to oils, greases, alkalies, and moistures. It's a tough coating . . . made to resist temperatures up to 240° Fahrenheit.

3 PlasTex *is* easy to clean—improves sanitation because it doesn't absorb odors or food particles.

4 PlasTex *outwears* other coated and uncoated beltings. Proof of this is to be found in results obtained by leading food processors, all over the U. S. A.

GET THE WHOLE PLASTEX STORY—AND A FREE SAMPLE. WRITE DEPT. C.

BUFFALO WEAVING & BELTING COMPANY

Chicago Buffalo 7, N. Y. New York

Serving Industry for Over Fifty Years

Frick Refrigerating Unit

TRADE FRICK MARK Refrigeration

Is used in this great store of the Penn Fruit Co. at 19th and Market Streets, Philadelphia.

The job here is to cool 7 self-service display cases for dairy products; 4 display cases for poultry and fish, with 1 for flowers; 60 ft. of cases for meats, 48 for delicatessen, and 48 for eggs and cheese; plus 5 large bulk storage rooms.

This diversified load is carried by 14 Frick refrigerating units. Installation by the Mack Machine Co. of Pa., who had previously sold 79 Frick machines for use in Penn Fruit stores.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

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Let Us Help You!

If skin irritations are a problem in your plant let us send you a trial quantity of Tarbonis. In literally hundreds of plants Tarbonis has proved a real help not only in overcoming skin irritations that have occurred, but also in guarding against their recurrence. Pleasant to use—easy to apply —sure of workers' cooperation. Does not interfere with the work to be done. Use the coupon . . . now.

Send for a sample of Tarbonis NOW.

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• IN FOOD PROCESSING

When You Use Low Temperature

USE CORK

The time to make sure of your insulation protection is before you build or expand. Get the facts on Cork insulation when they can do the most good. Cork is so efficient in insulating properties that its performance has long been the accepted standard for low temperature requirements. Its wide usage in the refrigeration industry is due to its proved record for more than 40 years. Mundet refrigeration engineers are experienced in all details of temperature control. Write to us now for recommendations and estimates . . . let us help you secure the most profitable use of low temperature. Mundet Cork Corporation, Insulation Division, 65 South 11th Street, Brooklyn 11, New York.

MUNDET CORK INSULATION

age. With an accessory attachment a cardboard or scored U-board may be coded, dated and automatically fed into the intake pocket of the machine.

Spray Gun 26

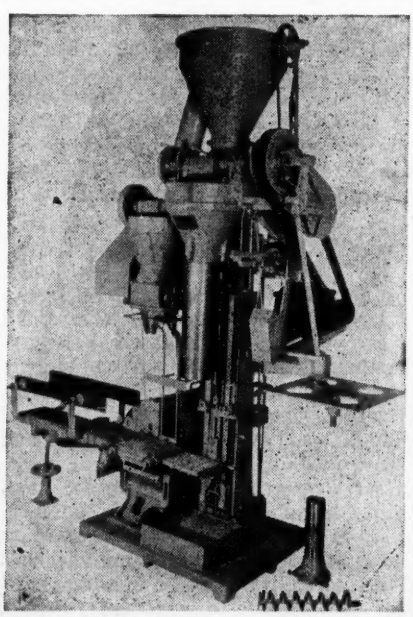
AN aerosol gun recently placed on the market by Mayfair Industries, Inc., Dept. I, 2442 Irving Park Road, Chicago 18, Ill. has no moving parts and does not employ steam. The gun automatically converts the aerosol

Aerosol gun has no moving parts.

concentrate used to gas by thermostatically controlled heating means. Electrically operated, it weighs but 6 lb., is 12 in. long and 9 in. high. To operate, the filler cap is removed from the back plate and a charge of concentrate poured in. A few minutes are required to change the liquid to gas after which the gun is ready for several hours of operation.

Improved Packer 27

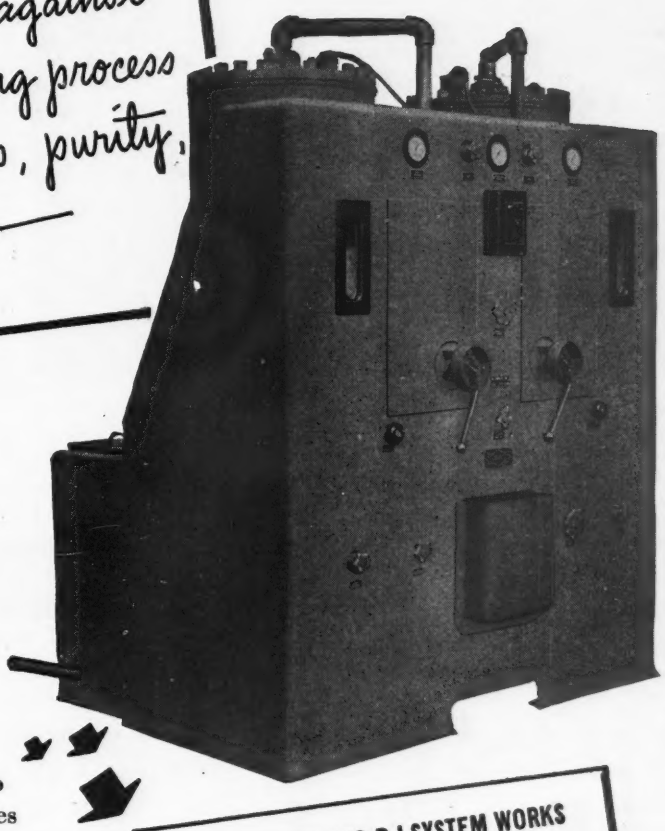
TRIANGLE PACKAGE MACHINERY CO., Dept. I, 906 N. Spaulding Ave., Chicago 51, Ill. has announced improvements in their line of heavy-duty auger packers to eliminate operator fatigue and provide a higher output per hour. The new design



Improved auger packer has higher output.

Memo to all users of process water..

Check the Dorrco D-I System against your present method of obtaining process water; compare costs, capacities, purity, and operating simplicity —



Using high-speed, high capacity ion-exchange resins, the Dorrco D-I System provides a new and *cheaper* source of specification water for the industrial user . . . by the de-ionization process.

√ **COST** — Depending upon the mineral concentration of the raw water, the Dorrco D-I System provides pure water averaging 2 to 20 cents per 1000 gallons — a fraction of the cost of distilled water.

√ **CAPACITIES** — Illustrated at the right is the Dorrco D-I "E unit" which is available in 6 sizes with capacities from 100 to 1500 gallons per hour. Other D-I Systems range from a few gallons to several million gallons capacity per day.

√ **PURITY** — The Dorrco D-I System will (a) remove simple hardness, (b) decrease bicarbonate alkalinity and reduce total solids, or (c) remove virtually all ionizable solids to produce the equivalent of distilled water . . . in most cases a water of standard U.S.P. distilled quality.

√ **SIMPLICITY OF OPERATION** — Compact and simple to start up, the Dorrco D-I "E unit" requires no operator except during regeneration periods. It is engineered so that no untreated water can possibly reach treated water storage tanks.

If you need process water of any purity . . . up to the equivalent of distilled quality . . . it will pay you to investigate the dollar-saving Dorrco D-I System. For detailed information phone or write our nearest office.

HOW THE DORRCO D-I SYSTEM WORKS

PRIMARY TREATMENT STAGE: raw water is passed through a bed of cation resin exchangers which removes the calcium, magnesium, sodium and other metallic constituents.

SECONDARY TREATMENT STAGE: partially treated water from the primary stage is passed through a bed of anion resin exchangers which removes the acids generated in the primary stage.

RESULT — mineral and acid free water.

REGENERATION: Cation and anion exchangers are regenerated for repeated reuse — the former with an acid and the latter with an alkali.

DORRCO

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Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

DORR

RESEARCH ENGINEERING EQUIPMENT

Sound Checkweighing Saves Product Everytime

Filling and checkweighing fruit cartons on EXACT WEIGHT Scales — Santa Clara Frosted Foods Co., Santa Clara, California.

Pictured above are operators filling and checkweighing fresh fruit cartons for quick freezing. Fast, end-tower EXACT WEIGHT Scales are used to attain a uniform package, accurate weight (16 ozs. net). Such packaging saves fruit every time . . . makes for a profitable operation for the processor. This is but one of hundreds of food packaging operations served by EXACT WEIGHT Scales. There are models for canning, dry packaging and glass containers, too. Write for full details for your business.

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Exact Weight Scales
THE EXACT WEIGHT SCALE COMPANY
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STE-VAC

Six models meet every requirement

LIQUID FOOD **HEATERS**

High Temperatures
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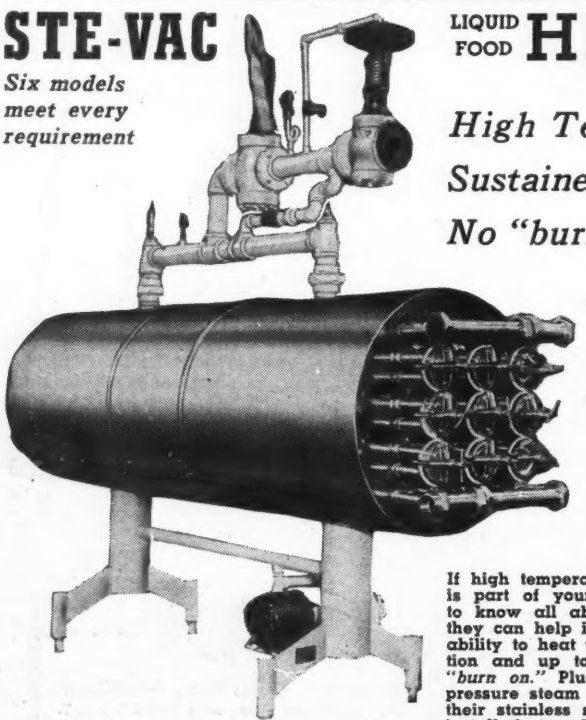
No "burn on"



- **5,000 to 40,000 lbs. per hour capacity.**
- **Quickly adapted to practically any liquid food heating operation.**

If high temperature processing of liquid foods is part of your plant operation, you'll want to know all about Ste-Vac Heaters and how they can help increase production. About their ability to heat up to 190° in one stage operation and up to 240° in two stages—*without "burn on."* Plus their utilization of dry, low-pressure steam under self-acting controls. Plus their stainless steel construction, their ease of installation and the many other Ste-Vac features which make them readily adaptable to *your* plant and product, and assure you of maximum heating efficiency.

Shown above is the SV-40, largest of the Ste-Vac Heaters. Its 48 tubes, each 10' in length, can handle up to 40,000 lbs. of liquid food products per hour. Floor space required: 40"x11'6". Shipping weight: 3800 lbs.

Designers and manufacturers of foods handling equipment since 1899.

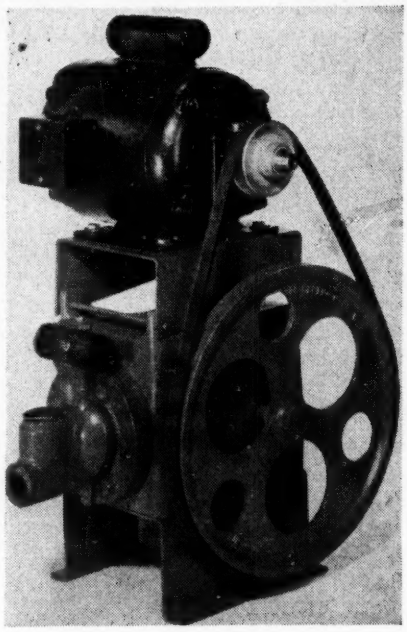
There's a Ste-Vac Heater for your particular needs. Write for detailed information and specifications.

CHESTER DAIRY SUPPLY CO.
5TH & TILGHMAN STS. CHESTER, PENNA.

eliminates foot pedals and makes it possible for the operator to start the filling operation by lightly touching a lever as he puts the container in position on the machine. From this point on the entire operation is automatic.

Feed Pump 28

A SMALL feed pump for boilers up to 10 hp. at pressures up to 200 lb., has been developed by the El Serenco



Boiler feed pump for small installations.

Machine Works, Dept. I, Azusa, Calif. Operated by a ⅓ hp. motor, it will pump up to 80 g.p.h. of water, light oil or chemicals. Overall size is 22 x 17 x 10 in.

Sanitary Table 29

A NEW type of stainless steel top table has been introduced by Anderson Bros. Mfg. Co., Dept. I, Rockford, Ill. The top is made of 16 gage stainless steel and the corners are welded and polished smooth. The top is not fastened to the base and can be easily lifted off for cleaning. The base is made of square steel tubing with rounded corners. It is of sturdy welded construction, metal zinc sprayed followed by a second coat of sprayed aluminum. The table is made in one size only, 26 in. by 44 in. by 30 in. high.

Flow Recorder 30

AN electrically operated secondary instrument for use with mechanical flow meters, or as a record-indicating-totalizing tachometer, has been announced by Builders-Providence, Inc., Dept. I, Providence, R. I. The instrument is actuated by impulses over a two-wire circuit from a transmitter which is mechanically driven by the primary meter. No power supply is necessary for the primary instrument. The transmitter consists of a switch

One way to cut overhead in the food freezing business

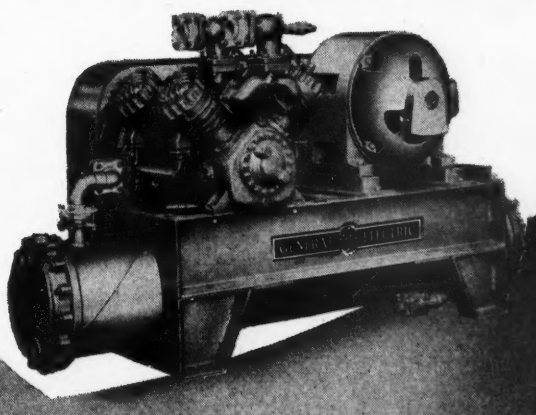
YOU don't have to be saddled with high refrigeration costs during your slack period.

General Electric distributors and contractors can design for you a modern, multiple unit system using "Freon" refrigerants. Such a system is devised to give you the capacity you need at the peak of the season — yet is economical in operating cost during the slack seasons.

Ask your General Electric distributor or contractor for suggestions in planning a modern refrigeration system that will keep overhead down. He'll be glad to help. *General Electric Company, Air Conditioning Department, Section 7105, Bloomfield, N. J.*

GENERAL ELECTRIC

MAKE A GENERAL ELECTRIC CONDENSING UNIT THE HEART OF YOUR REFRIGERATION SYSTEM



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Contains no rubber.
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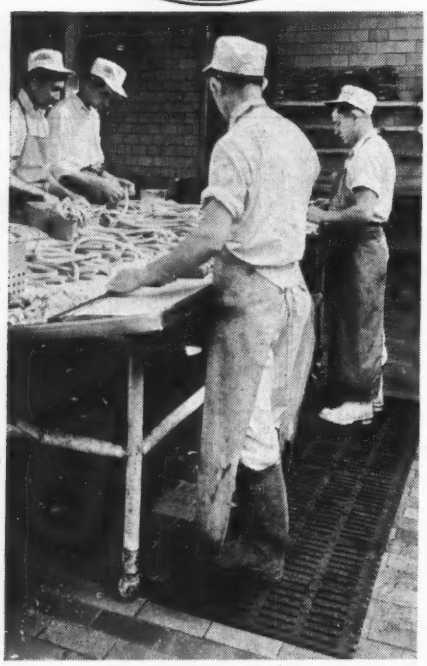

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TUF-TRED TIRE FABRIC MATTING

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EZY-RUG RUBBER LINK MATTING

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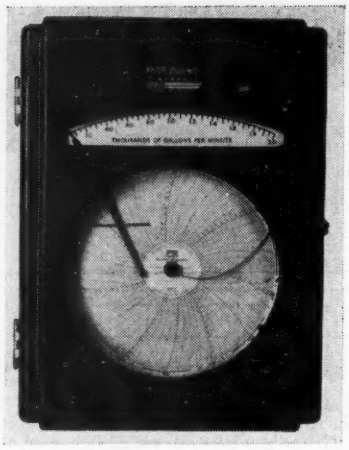

Recording-indicating-totalizing tachometer.

which makes a contact for a predetermined number of gallons as they pass through the meter. The new instrument provides readings of total flow, rate of flow and a chart record of flow over any distance from a few feet to many miles from the primary instrument.

Marking Stick 31

FOR marking tare weights, names and code numbers on milk cans and other dairy products containers for quick, positive identification, the Lake Chemical Co., Dept. I, 607 N. Western Ave., Chicago 12, Ill., has introduced a stick form marking paint. Stick-O-Paint is real paint in stick form, but contains no lead and is ideal for use around foods. Handy as a pencil to use, it eliminates brushes and banishes mess.

Metal Ramp 32

A NEWLY designed light weight metal bridge ramp, to be used between warehouse or loading dock and car or truck is announced by Pallet Engineering Co., Dept. I, 625—2nd St., San Francisco 7, Calif. Features include independent positive locking devices on each side of the ramp; high side guards; lightweight construction; diamond safety plate and perfect fitting edges.

Frozen Food Dispenser 33

A NEW self-service frosted food dispenser, which delivers a package at the touch of a button, is announced by the Frosted Food O'Mat, Inc., Dept. I, 1521 Park Bldg., Pittsburgh, Pa. To operate, the shopper looks at an attractive display case, lightly touches a button, and out drops the package. The gleaming white all-steel constructed cabinet combines outstanding features of display with ease of operation. Each item has its delivery button which, when pressed, immediately delivers a package without the purchaser opening a door.

MERCURY SWITCHES

are used in all Mercoid Controls. They assure better control performance and longer control life. That is why Mercoid Controls rate a very high percentage of customer satisfaction -a good reason for specifying-

MERCOID CONTROLS

Dust, air, gases and moisture impair the efficiency and shorten the life of exposed electrical contacting surfaces.

Mercoid hermetically sealed mercury switches are immune to all of these switch damaging elements. The contacting surfaces remain constant in their efficiency, prolonging the life indefinitely.

Mercury switches bearing the registered trade mark name of "Mercoid" are not subject to open arcing, oxidation, corrosion, pitting or sticking of the contacting surfaces.

Mercoid switches are available to the trade in various designs, sizes and capacities.

There are numerous applications where these switches have a definite advantage over the open contact type switches.

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★CONTROLS★
FOR HEATING, AIR CONDITIONING, REFRIGERATION AND VARIOUS INDUSTRIAL APPLICATIONS

CATALOGS, BULLETINS

This digest of manufacturers' new publications is offered by FOOD INDUSTRIES Reader Service as a convenience for executives. The editors feature catalogs, data sheets and technical pamphlets likely to interest purchasing agents, superintendents, packaging men and food technologists.

Food Plant Equipment

Dry Labeler 51

New Jersey Machine Corp.—Release on dry labeling describing the Pony Label-dri for applying labels to bottles, jars, ampules, boxes, and containers at maximum speed of 60 per min. Contains illustrations and specifications.

Boilers 52

Titusville Iron Works Co.—Bulletin B-3075 contains eight pages giving complete details on the Scotch marine power boilers made by this company. Detailed diagrams illustrate the various types of boilers and specification tables are included.

Automatic Weigher 53

Wright's Automatic Machinery Co.—4-page illustrated bulletin on Hy-Tra-Lec, Model A automatic weigher designed for weighing potato chips and like products at pre-determined net weights from ½ to 2 oz.

Electric Motors 54

The Leland Electric Co.—Section 600. 8-page booklet illustrating and describing general purpose continuous duty explosion-proof motors made by this company.

Pressure Filtration 55

"Filtration"—an illustrated bulletin describing continuous production filtration equipment for pharmaceutical, bacteriological, biological and fine chemical and food industries employing Selas microporous filter media is published by Selas Corp.

Pecan Machinery 56

Champion Pecan Machine Co.—4-page folder describing the pecan graders, humidifiers, shellers, shell remover units, cleaner and meat grader, grading and picking tables made by this company.

Humidifiers 57

Armstrong Machine Works—Bulletin 156 on Armstrong Humidifiers in Industry. Contains application photographs together with listing of a large number of installations in many industries.

Heat Transfer Equipment.....58

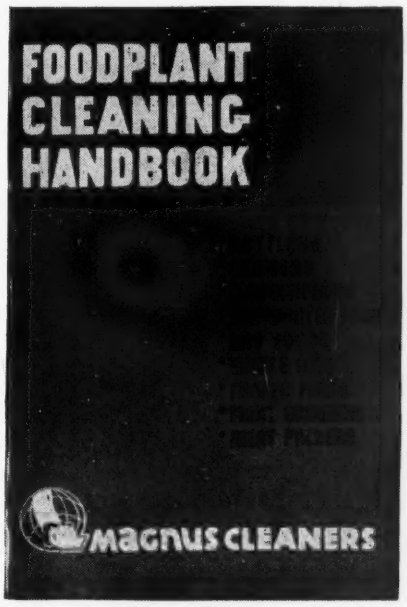
Young Radiator Co.—8-page Catalog No. 143, "Young Heat Transfer Equipment for Every Application." Describes and illustrates the many heat transfer products manufactured by this company.

Hot Water Regulators.....59

The Powers Regulator Co.—Condensed catalog No. 3035 contains complete line of regulators and thermostatic water mixing valves made for water temperature control. Thermostatic regulators and valves are shown for all types of hot water heaters, and 3-way mixing valves for two-temperature water systems; all types of shower baths, individual, gang and zone showers; X-ray and photo developing baths; industrial processes and laboratories; steam and water mixers for dishwashers and various thermostatic water mixing valves used in washing autos, trucks and buses.

Cleaning 60

Magnus Chemical Co.—42-page Foodplant Cleaning Handbook contains illustrations and instructions for cleaning equipment and plant in many types of food operations.



Induction Heating 61

General Electric Co.—3, 4-page folders on GE Electronic Induction Heaters (5 kw., 20 kw., and the new 5 kw., 40 megacycle preheater). Contains illustrations and specifications.

Food Freezing 62

Salem Engineering Co.—Bulletin No. 446 on "Salematic—The Revolutionary Food Freezing and Handling Installation." Pictures show details of how food goes through freezing chamber and when frozen comes out the door ready for storage or shipping. Also 8-page catalog on Salem Automatic Locker Plants.

Filters 63

Alsop Engineering Corp.—22-page bulletin No. 144 describing Alsop "Disc-Pak" filters. Illustrated with photographs of the filters, filter disks and electric mixers made by this company. Also line drawings suggesting methods of connecting filters in several installations.

Rotary Pumps 64

Worthington Pump & Machinery Corp.—Bulletin W-484-B1 on general service Type GA rotary pumps. Contains photographs and descriptions of the models available and tables of capacities and dimensions.

Humidifying 65

The Bahnson Company—Bulletin No. 330 describing the Bahnson Humiduct, a unit system of air conditioning for humidifying, cooling, heating, ventilating, filtering and dehumidifying in any desired combination.

Food Machinery 66

The Machinery Dept. of E. G. James Co. have just issued their new 1947 catalog. It shows the feature items from over 50 companies in 120 pages of pictures and specifications.

Colloid Mills 67

Premier Mill Co.—"Premier Colloid Mills," a 15-page illustrated brochure discussing the different types of colloid mills and mixers made by this company.

Air Filters 68

American Air Filter Co., Inc.—23-page illustrated booklet discusses various types of industrial dust problems and typical applications of AAF air filters to such problems.

Motors 69

Two recent bulletins on "Series C" induction motors have been published by The Reliance Electric and Engineering Co. Bulletin C-118 covers protected frame sizes 203 to 326, with horsepower ratings from ½ to 20, 600 to 3,600 r.p.m. Bulletin G-125 covers totally inclosed, fan-cooled motors with squirrel-cage frame sizes 224 to 326, for 2 to 3 phase a.c. circuits.

Filling Machines 70

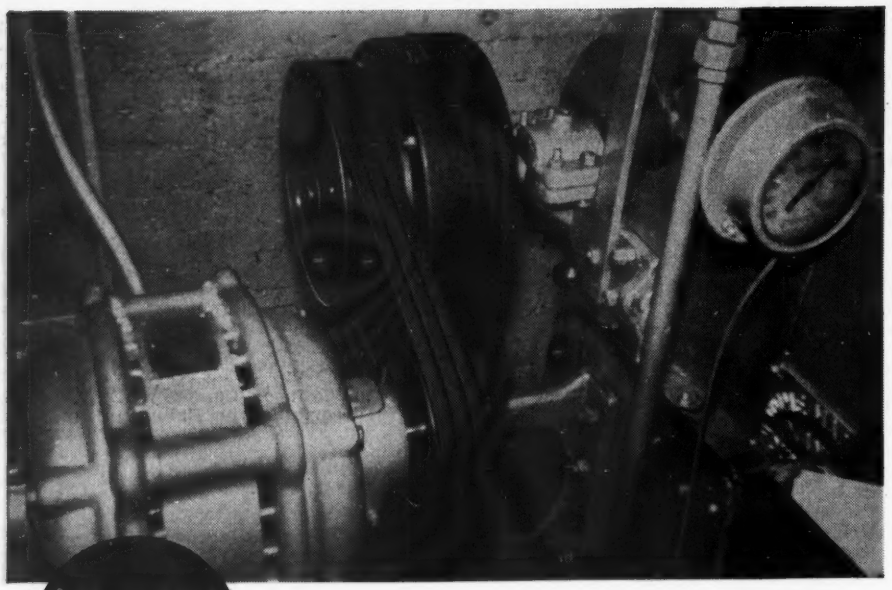
F. J. Stokes Machine Co., 23-page catalog, No. 908-A shows machines for handling liquids, semi-liquids and heavy pastes either hand operated or automatic.

Processing Equipment 71

Chain Belt Co.—Bulletin No. 47-1, "Rex Food Processing Equipment." An attractive 16-page booklet illustrated with many photographs and line drawings, together with descriptions of the Rex Thermo-Roto process for cooling sealed cans after the heat process, deaeration of liquid and semi-liquid food products and the Rex juice processing line. Bulletin 437 on Rex Z-Metal chain

HOW TO GET THIS LITERATURE

Food Industries Reader Service now supplies tear-out coupon cards for your convenience in requesting copies of these new publications from manufacturers. Use one or more of the cards on the colored sheet bound near this page. Fill out, tear out, mail out and the Reader Service staff will see that your requests reach the manufacturers.



Machine down-time for repairs was eliminated, maintenance cut 90%—on this machine operated at 22 rpm. by an American Reduction Drive, Installation took just 3 hours, floor space was saved and shock loads eliminated. Yes, it's *"Tailored Speed"* for Top Production!

NOW For Top Production It's *"Tailored Speed"* That Counts!

How "TAILORED SPEED" Helps You Boost Output On Slow-Speed Machines

Here's a *different* reduction drive principle that really opens the door to maximum machine output! Yes, it's the unique *"Tailored Speed"* principle of American Reduction Drives that does it. Here's why: American Reduction Drives give you *more* than just the right speed for your job. They safeguard motor and gears from costly damage because the primary belt drive absorbs shock loads. Further, American Reduction Drives are easy to install. And once on the job, speed changes are quickly, *easily* made—just by altering the ratio of the primary belt drive. The result is higher operating efficiency, less machine down-time—a drive virtually "tailor-made" for *your* job! Yes, *"Tailored Speed"* adds up to increased production—rock-bottom maintenance costs!

Take this sure step for top production, now. Give your slow-speed equipment all the advantages of American Reduction Drives. For complete engineering data, drop us a line requesting the American Reduction Drives Handbook.

- *"Tailored Speed"* Means Versatility Too!
- American Reduction Drives, with standard 13 to 1 ratio Reduction Units, deliver any required output speed from 11 to 154 rpm.
- Six standard sizes will handle jobs from 1/4 to 25 hp.

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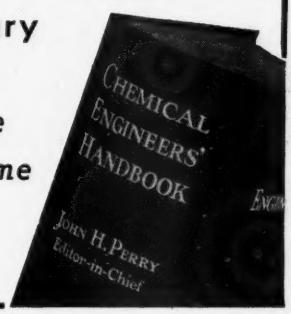

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Position Food-5-47

For Canadian price write Embassy Book Co., 12 Richmond Street E., Toronto 1.

belts for handling materials under practically any and all operating conditions. Numerous application photographs included.

Materials Handling

Materials Handling 72
Market Forge Co.—Bulletin No. 1008 MH, 4-page leaflet featuring materials handling equipment such as manually operated lift trucks, load skids and gravity conveyors.

Industrial Trucks 73
Elwell-Parker Electric Co. — New illustrated catalog describes the various types of power industrial trucks and cranes manufactured by this company. Principal specifications are given.

Gas-Electric Drive 74
Ready-Power Co. — Bulletin No. 114 describing Model "Z" unit gas-electric power for motorized lift trucks. A 4-page bulletin containing illustrations, description and specifications.

Lift Trucks 75
Truck-Man, Inc.—6 pages of information on Model D Truck-Man, gasoline powered hydraulic lift truck.

Fork Trucks 76
The complete line of material handling machines, both gas and battery powered, manufactured by Tructractor Div. of Clark Equipment Co. is presented in a 36-page catalog. The catalog introduces the new Clark "Yardlift" series of pneumatic tired fork trucks. Also illustrated are Clark's wide variety of handling attachments for use on fork trucks.

Pallets 77
The first pallet catalog in the history of material handling has just been released by Acme Pallet Co. It is a comprehensive, easy to understand handbook which illustrates various types of pallets and their correct applications for efficient palletization. Variations in pallet construction for handling all types of materials are covered in detail. Numerous photographs illustrate the adaptations of standard types of pallets.

Control Equipment

Feed Water Control 78
New performance data are included in Bailey Meter Company's bulletin 104-B, "Bailey Three-element Feed Water Control." This 15-page bulletin lists a number of advantages of this system, shows chart records illustrating operation under difficult conditions and gives a list of users.

Control Equipment 79
Northern Equipment Co. — Bulletin No. 465. An 8-page performance report on boiler water level control at West Reading Station of Metropolitan Edison Co. Illustrated with photographs and sectional views of equipment and charts.

Combustion Control 80
Combustion Control Corp.—Bulletin 604 on Fireye, the safe, modern electronic combustion safeguard for oil, gas and pulverized coal burners.

Temperature Control Systems 81
The Wheelco Instruments Co.—20-page bulletin No. 5 on "Automatic Temperature Control Systems" is a valuable guide for anyone interested in process instrumentation. Charts,

STOP DUSTING!

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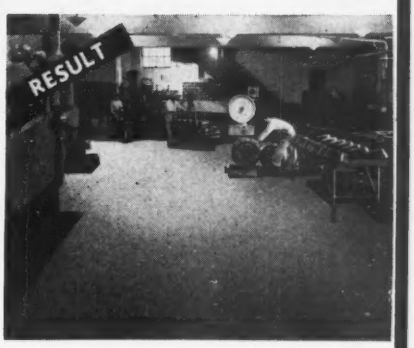

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As the foremost manufacturer of pure vitamins and minerals, Merck has served as a central and dependable source of enrichment ingredients. Backed by thorough experience, extensive resources, and rapidly expanding production facilities, we will continue to serve the baking field and other branches of the food industry eager to incorporate decisive nutritional advantages into their products.

MERCK ENRICHMENT PRODUCTS

Merck provides an outstanding service for the milling, baking, cereal, and macaroni industries.

Merck Enrichment Ingredients

Merck Vitamin Mixtures for Flour Enrichment

Merck Bread-Enrichment Wafers

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Merck Vitamin Mixtures and Wafers for Macaroni Enrichment

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tables and diagrams explain measurement and automatic control and the selection of proper control systems for process applications.

Check Valves 82

The Williams Gauge Co. — 4-page folder featuring the flanged silent check valve made by this company. Construction details are shown in cutaway views, and dimensions are tabulated for the various size valves. Several photographs show applications.

Plant Supplies

Industrial Clothing 83

Archer Rubber Co.—8-page catalog of the industrial work clothing manufactured by this company.

Sprout Inhibitor 84

American Cyanamid Co.—Leaf 1001, "Barsprout Retards Sprouting," tells how to forestall potato sprouts by use of the sprout inhibitor "Barsprout."

Colors 85

Sun Chemical Corp.—Foldout sheet entitled "Color in Electromagnetic Energy." Contains a simplified spectrum chart and indicates the position on the chart of various practical applications such as induction heating, commercial broadcasting, television and radiant heating. The portion of the spectrum giving off visible light is indicated.

Brine Making 86

International Salt Co.—"The Lixate Process of Making Brine"—a 35-page booklet with many photographs and diagrams of typical installations. Contains 6 pages of sodium chloride brine tables, and 2 pages of tank dimensions and capacities.

Coatings 87

The Merchant Chemical Co. — New brochures describing Dy-Nes-Co, maintenance coating, Dyna-Clad, production and maintenance finishes and Dyna-Flex strip coatings.

Miscellaneous

Water Conditioner 88

Cochrane Corp. — Pub. 3000, a 68-page brochure on water softening at relatively high temperatures.

Chemicals 89

"Synthetic Organic Chemical Products" is the title of a 60-page catalog No. 44, describing products of the Technical Products Division of The Emulsol Corp.

Puerto Rico 90

Puerto Rico Development Commission—48-page brochure "Industrial Opportunities in Puerto Rico U.S.A." contains a large number of illustrations. Discusses manpower, materials and markets.

Waterproofing 91

A 4-page folder issued by Building Products Div. of L. Sonneborn Sons, Inc., tells the story of Hydrocide Colorless, an invisible water-repellent treatment for exterior concrete and masonry building walls above grade. Contains application data and coverage figures.

Plastic Dip Tanks 92

Aeroil Products Co.—Two-page flyer illustrating and describing various models of dip tanks for application of plastic coatings to various types of objects. Discusses temperature control.

THIS shipper has *humidity headache* — because his shipment of canned goods was damaged by excessive airborne moisture while at sea.

And the whole thing could have been prevented if someone had told him about Cargocaire.

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Canned goods shipped by water often run the danger of costly sweat damage. This comes at the "dewpoint" . . . *that point at which moisture forms.*

During any voyage a ship's cargo may meet its "dewpoint danger hour"—when the weather changes. Sweat forms in the hold. Moisture condenses on the cargo.

With canned goods, labels are spoiled. Corrosion causes pinholing —and in extreme cases "leakers" may occur.

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To avoid *humidity headache* and poor out-turns many shippers use only vessels equipped with Cargocaire.

This modern dehumidification and ventilating system eliminates "dewpoint danger hours." It operates when the moisture content of the air approaches the danger dewpoint. It prevents sweat damage to cargoes even when the ship passes through constantly changing weather-fronts.

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To put an end to *humidity headache*, ask for the services of the Cargocaire Technical Advisor. There's no obligation on your part.

If you ship products endangered by label discoloration, cans bulging or rusting . . . or if you ship such commodities as coffee, sugar, cocoa, packaged foods or tobacco, you'll certainly want to investigate Cargocaire!

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FOOD TECHNOLOGY
NEW DISCOVERIES AND INVENTIONS

PACKAGING

Packing Leafy Vegetables

PRESERVATION of fresh appearance and condition of leafy vegetables during shipment is claimed for a recently patented method of packing. Discoloration of the butts and ribs of the outer leaves of lettuce can be inhibited by spraying, dipping or swabbing with aqueous solutions of sodium thiosulphate, sodium hyposulphite, sodium metabisulphite, and the corresponding water-soluble salts of potassium, magnesium and calcium. The upstanding butts of a layer of lettuce heads in a crate are treated with the inhibiting solution, covered with a sheet of moisture-resisting paper and a layer of crushed ice, on which additional layers can be similarly packed. Or a sheet material can be used that is composed of an impervious layer and one that is relatively absorptive. In this case the sheet can be dipped into the inhibiting solution and laid over the butt ends of the lettuce with the absorptive layer in contact with the lettuce.

Digest of U. S. Patent 2,413,129, issued December 24, 1946, on an application dated March 13, 1945, to William H. Wilson, and assigned to Fruit and Vegetable Processing Co., Los Angeles, Calif.

FRUITS

Making Marmalade

IMPROVEMENT in the process of preparing citrus fruits for the manufacture of marmalade, jam, or other preserve, is revealed in a recent patent. Instead of treating the peel and pulp separately, as ordinarily practiced, the invention contemplates treatment of the whole fruit in a continuous operation without material loss of pectin, sugar, or juices of the fruit. Whole oranges, for example, are first abraded over their entire surface to remove the outer waxy surface and make it permeable to the processing solution, and to permit escape of oil which may impart a bitter taste to the product. The whole oranges are then submerged in a weak water solution of an organic or mineral acid which may lawfully be used in the preparation of food. For orange marmalade a strength of one-half percent acid at a temperature of 180—200 deg. F. for one or two hr. is satisfactory. The principal function of the acid is to convert protopectin to pectin and improve the condition of the peel. When the process is finished the oranges are rinsed with water, cut and sliced or shredded as desired. To the fruit thus prepared is added the required amount of additional sugar and pectin, and the mixture is then cooked for the period of time necessary to finish the marmalade.

Digest from U. S. Patent 2,407,801, issued September 17, 1946, on an application dated June 12, 1942, to O. J. Steinwand, Redwood City, Calif.

CEREAL PRODUCTS

Coffee Concentrate

PATTERNED after the concentration of fruit juices by freezing out some of the water and removing it as ice, experiments have been made on concentrating coffee extracts by freezing and centrifuging. Using commercial blends of coffee, it was found possible to obtain almost complete extraction at 176 to 185 deg. F. in 20 min. These conditions were chosen for experimental purposes. A scheme of serial extraction was worked out, to produce a concentrated extract and at the same time exhaust the coffee grounds. It was planned to produce an extract containing 18 to 20 percent solutes, and to increase this to about 36 percent by freezing. Batches of 454 g. of coffee and 800 ml. of water were used in the serial extractions, pressing the coffee between each operation. Freezing experiments were made with 2286 g. of extract containing 18 percent of solutes, and 1846 g. of extract containing 15.8 percent solutes. The first lot was frozen in a room at 14 deg. F. for five days, which proved too low a temperature, as the ice after twice centrifuging still contained a substantial percentage of solutes. The second lot was frozen at 121 deg. F. for five days. When centrifuged, it yielded on the first operation 978 g. of liquid containing 27 percent solutes and 868 g. of ice. When the latter was again centrifuged it yielded 231 g. of liquid containing 6.9 percent solutes, and left a residue of 637 g. containing only 0.8 percent solutes.

Digest from "The Concentration of Coffee Extracts by Freezing," by R. Gane, *Food Manufacture*, vol. 21, No. 12, 519-524, December 1, 1946.

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DEHYDRATION

Contaminated Egg-Powder

DIRTY egg shells are a significant source of the *Salmonella* organisms found in spray-dried whole-egg powder, over 5,000 samples of which revealed a relatively high incidence of such contamination. Field studies at six dehydration plants and in two field laboratories, one in Texas and the other in Illinois, yielded ample evidence of *Salmonella* contamination on and in egg shells, in shell membranes, in liquid whole egg at different processing stages, and in spray-dried powder. Clean eggs showed the least contamination on and in the shell, with none in the shell membrane or the liquid contents. Eggs classed as dirty, light-dirty, or washed-dirty showed contamination on and in the shell, in the membrane and in the liquid whole egg. Washing dirty eggs with hypochlorite solution followed by rubbing or brushing, is not only

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GERM FREE
means a
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ineffective in removing *Salmonella* contamination, but increases the probability of forcing the microorganisms into or through the shell pores. The only way to reduce the incidence of *Salmonella* contamination of spray-dried whole-egg powder is to use fresh, clean shell eggs in its manufacture.

Digest from "An Investigation of a Source and Mode of Entry of *Salmonella* Organisms in Spray-Dried Whole-Egg Powder," by M. Solowey, E. H. Spaulding and H. E. Goresline, *Food Research*, vol. 11, 380-390, September-October, 1946.

Drying Coconut Meat

DESICCATING apparatus, specially designed to dry shredded coconut meat, consists of a plurality of drying units arranged horizontally, through which superposed conveyors carry the material to be dried. Each unit is equipped with mechanism for heating and circulating air over the material on the conveyors, the circulation being alternated in successive units. Required temperature is maintained by thermostat. Each unit is also provided with means for agitating the shredded coconut, consisting of blades mounted on a rotating core. Blades are turned alternately in opposite directions so the material is thrown alternately to right and left, thus facilitating uniform drying.

Shredded material is fed to the topmost conveyor at one end of the series of units, spread to uniform thickness by a corrugated roller, and discharged at the other end of the unit onto a lower conveyor running in the opposite direction. This operation is repeated on successively lower conveyors until the dried material is discharged from the last one.

Digest from U. S. Patent 2,411,179, issued November 19, 1946, on an application dated April 7, 1944, to Louis H. Zeun, and assigned to Peter Paul, Inc., Naugatuck, Conn.

BAKING

Bread Composition

DISPERSION of undissolved salt throughout the baked loaf is the essence of a recently patented bread composition and process. The general process is commonly known as the sponge dough method, wherein a primary sponge or ferment is set. After fermenting for 4½ hr., more flour and other materials are added, and the dough is mixed at slow speed for about 6 min. One minute before the mixing is completed, an appropriate quantity of gravel salt crystals is added and thoroughly

(*Continued on page* 200)

to meet competition?

FOOD SALES ANALYSTS predict more competition ahead for all kinds of food products.

Manufacturers, looking ahead, are devising ways to meet this increased competition.

What better way to get housewives to reach for your product than to give it extra "nutrition appeal"?

Many mothers today no longer buy *just* food. They want better nutrition—more nourishment for the well being of their families.

This buying attitude will undoubtedly become even more pronounced as more housewives learn the value of the words "enriched" or "fortified" on a food package.

Food manufacturers long since recognized this buying trend. Many have already fortified their candies, cereals, baby foods and other products.

If you are considering fortifying one or more of your food products, remember this: If there are no definitions and standards for enrichment of the products you make, you may *fortify* without hesitation.

Standards Brands' experience in the food fortification field—and its products for vitamin B-complex, vitamin D and protein supplementation of foods—place this company in a position to render valuable assistance to you.

We will be glad to assist any manufacturer who may need help in fortifying food products. We invite you to discuss your needs in confidence with one of our executives. Write to the address below.

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Type 700-H

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Products containing

NATURAL B-COMPLEX FACTORS

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Pure Dry Primary Yeasts *(Brewer's Strain)*

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mixed in the dough. After the dough is mixed it is allowed to stand only 10 min. before it is mechanically divided and molded. Then follows a proofing period of 1 to 1½ hr., after which the pieces are baked for 45 min. at an oven temperature ranging from 410 deg. F. at the beginning of the process to 380 at the end. Details and formulas are given.

Digest from U. S. Patent 2,412,154, issued December 3, 1946, on an application dated July 22, 1942, to M. M. Jackson and Edward Hauser, and assigned to The Vienna Model Bakery, Inc., Chicago, Ill.

FATS and OILS

Infrared Radiation

USE of infrared rays to improve the digestibility and taste of foods containing oils and fats is claimed in a recent patent. The process is carried out by exposing the products to rays, the major portion of which are of wave lengths above 7700 Angstrom units, but with low heat radiation. Using coffee as an example, radiation is applied to the roasted and cooled beans, and care is taken to keep the temperature of the radiation below 200 deg. F. It is claimed also that beneficial results can be obtained from the treatment of coffee that has become undesirable for use by reason of age. Beans to a depth of 2½ in. are conveyed on a belt beneath a bank of lamps—clear, frosted and colored —of 200 watt, 50 candlepower at the intake end of the conveyor, and of 120 and 100 watt, 32 candlepower colored lamps at the discharge end. The speed of the conveyor varies with the type of coffee treated.

Digest from U. S. Patent 2,410,427, issued November 5, 1946, on an application dated April 23, 1943, to Bartlett H. Stafford Chappell, Hurley, N. Y.

Danish Lard Process

RAPID extraction of lard from pork fat is accomplished by a process in use in a number of Danish abattoirs. The fat is ground in a steam-jacketed grinder and then subjected to superheated steam, resulting in the production of relatively fat-free solids, melted fat, and water. The solids are screened from the liquid fat and water, and pressed to extract residual fat. The fat-water mixture is then thoroughly washed by injection of clean hot water, after which it passes through specially designed centrifuges that discharge clean dry fat, protein sludge, and water. The lard moves to a storage tank and then to a plasticizer and packaging machine. It is

it's good for 1,001 other food products . . . fresh, frozen, dried or preserved ★ Shellmar can show you how to cut packaging costs, reduce waste and spoilage, and get instant brand identification at point of sale . . . with colorful, functionally correct packaging materials.

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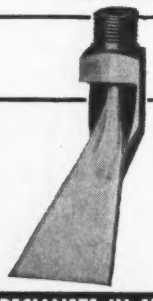

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claimed that the process will convert raw pork fat into lard ready for packaging in 15 minutes. The plant is reported to require only two men to handle about 2300 lb. raw pork fat, using 18 kw.-hr. of electricity, 772 lb. of steam and 317 gal. of water at the rated hourly capacity.

Digest from "Fats Reduced to Water, Lard and Solids for Centrifugal Separation," *The National Provisioner*, vol. 115, No. 26, 9-10, December 28, 1946.

VITAMINS

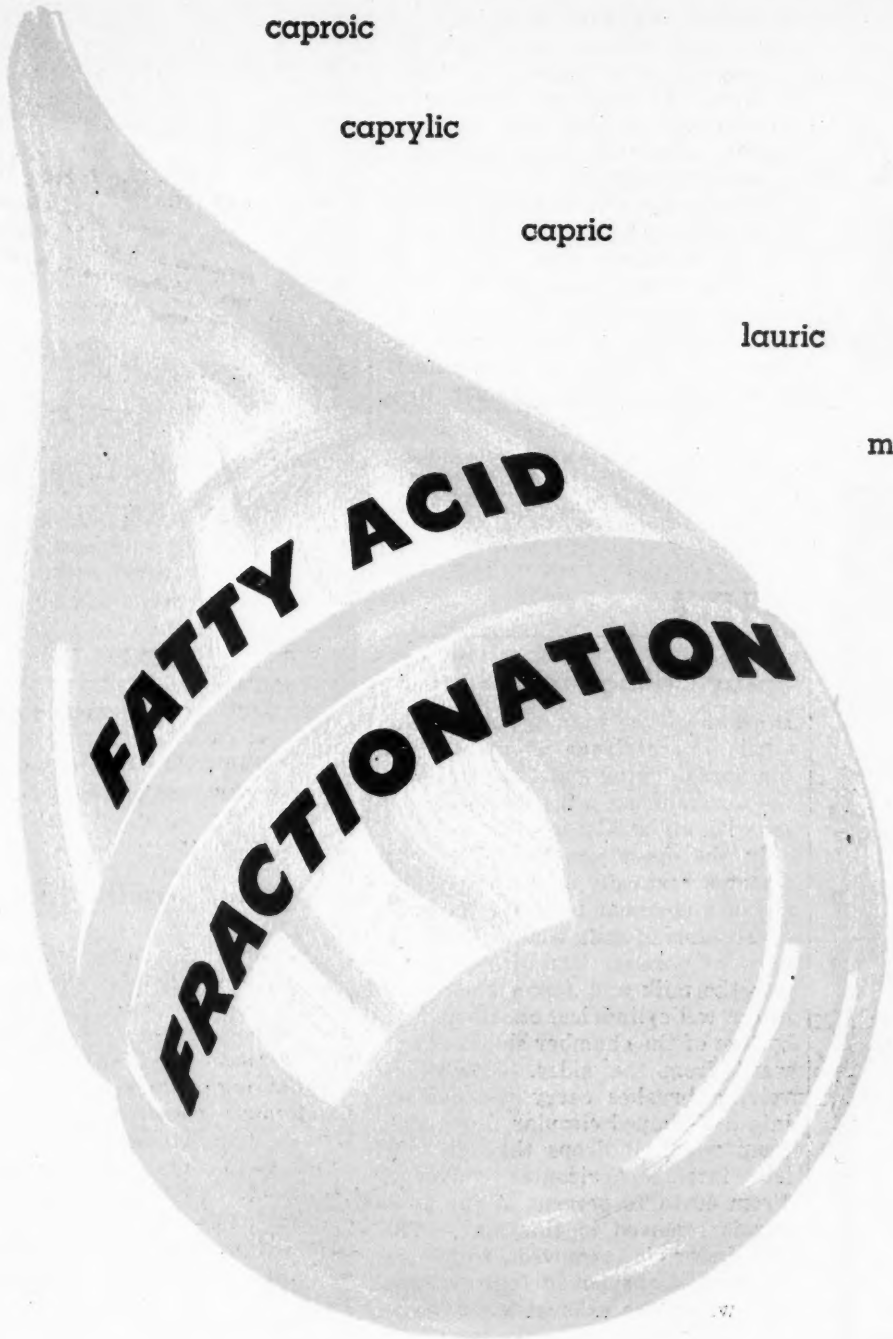
Preserving Vitamin Oils

STABILIZATION of oils, such as cod liver oil, against oxidative deterioration, maintaining vitamin potency in emulsions and aqueous dispersions, can be accomplished by dispersing the oil in such materials as blackstrap or sorghum molasses. For example, cod liver oil was slowly added to and agitated with blackstrap molasses until 15 percent of the oil was incorporated. The emulsion was set aside in open beakers at 98 deg. F. and later compared with untreated oil by making peroxide determinations. Peroxides in oil alone after 5, 15, and 30 days were, respectively, 38, 275, 1465. In oil-molasses emulsion the comparable results were 2.4, 15.8, and 183. The results are indicative also of the degree of protection against loss of vitamin A. Although thorough mixing of the oil and molasses will produce marked stability, still further improvement can be obtained if the mixture is homogenized. Additions of small amounts of lecithin, phosphoric acid, phosphatide or aliphatic polycarboxylic acid to the molasses will still further enhance its stabilizing properties. Other oils, such as castor and mineral, also may be stabilized against oxidative deterioration.

Digest from U. S. Patent 2,410,455, issued November 5, 1946, on an application dated March 11, 1939, to Sidney Musher, and assigned to Musher Foundation Incorporated, New York, N. Y.

Vitamin A from Brill Livers

SCARCITY of soupfin shark and dogfish led to a year's survey of the value of the livers of the flatfish as a source of vitamin A. Of all the flatfish investigated, the brill was the greatest reservoir of vitamin A, and was selected for further study. Thirty-six brill were selected, ranging in length from 12.6 to 19.3 inches. Weight, length and age of each fish were recorded, and the liver of each separately bottled. It was found that weight and length



caproic

caprylic

capric

lauric

myristic

palmitic

stearic

palmitoleic

oleic

linoleic

linolenic

C_{20} saturated

C_{22} unsaturated

The separation of mixed fatty acids into their pure component fatty acids has led to the improvement of many products and promoted development of new products.

Continued research into the science of precise fractionation – by distillation or solvent crystallization – has led also to development of better methods and equipment for accomplishing the separation.

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increased regularly with age, so length was selected as a basis for comparison of vitamin data. These showed: (1) That the quantity of vitamin A per fish liver goes up rapidly after fish have reached a length of 17 inches; (2) the potency per pound of liver also increases with age; and (3) the potency of the oil increases with the size of the fish, although not at the same rate as the quantity of vitamin A. The conclusion is reached that recovery of oil would be profitable if livers from only the longer brill were used.

Digest from "Vitamin A in Brill Livers," by L. A. Swain and W. E. Barraclough, *Process Reports of the Pacific Coast Stations, No. 69*, Fisheries Research Board of Canada, Vancouver, B. C., December, 1946.

DAIRY

Spray-Drying Milk

INSTEAD of the high pressure milk nozzle or centrifugal atomizer used for spray-drying milk in America, the Germans use a high velocity air jet with air at 572 to 662 deg. F.

In the operation, the hot air is directed vertically downward at the top of a chamber to strike horizontal streams of milk issuing from 10 pairs of nozzles. The air jet atomizes the milk and forces the spray into a tall cylindrical chamber. The bottom of the chamber slopes downward from the sides. Slowly revolving brushes carry the powder into a V-shaped circular depression from which it drops through outlets into a horizontal conveyor. From 60 to 70 percent of the powder is removed in this way. The remainder is removed from the common downspout of four cyclones into which the exhaust air flows.

Digest from "Deutsche A.G. fuer Nestle Erzeugnis," Office of Technical Services, Department of Commerce, Washington 25, D. C.

Frozen Milk Product

DESIGNED to overcome objectionable appearance and taste in reconstituted whole milk, a new process has been patented for which superior results are claimed. Cold fresh whole milk is separated to yield a cream having 40 percent butterfat, and the latter is pasteurized. The skim milk is transferred to a container where it is heated to 143 deg. F., and held for 30 min. while filtered air is blown through it, substantially reducing its water content to a ratio of 4 to 1. The concentrated hot skim milk and cream are mixed in the same proportions

CASE HISTORY No. 15
One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON
(Per Ton)

	200-lb. barrels	75-lb. paper bags
Container cost . .	$16.50	$ 4.07
Labor cost	2.60	1.30
Total bag and labor cost . . .	$19.10	$ 5.37
Saving per ton paper over barrels . . .		$13.73

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CHEMICALS ✓	FOOD
FEEDSTUFFS	MISCELLANEOUS

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CORROSIVE	HEAVY
DELIQUESCENT	HYGROSCOPIC
FLUFFY	LIGHT
FREE-FLOWING ✓	VISCOUS

ST. REGIS PACKAGING SYSTEMS are designed to meet a wide range of product requirements and plant layouts. Packers are available in a variety of sizes and types, with filling speeds as high as twenty-four 100-lb. bags per minute — with one operator. Nearly 400 commodities — rock products, fertilizers, chemicals, foods, and feeds—are now being packaged in sturdy, low-cost multiwall paper bags.

ALCOHOL *packed in Multiwall paper bags*

. . . with a triple saving for the Heyden Chemical Corporation

A recent addition to the growing list of products packaged in multiwall paper bags is Pentek — a powdered alcohol manufactured at the Garfield, N. J., plant of the Heyden Chemical Corporation.

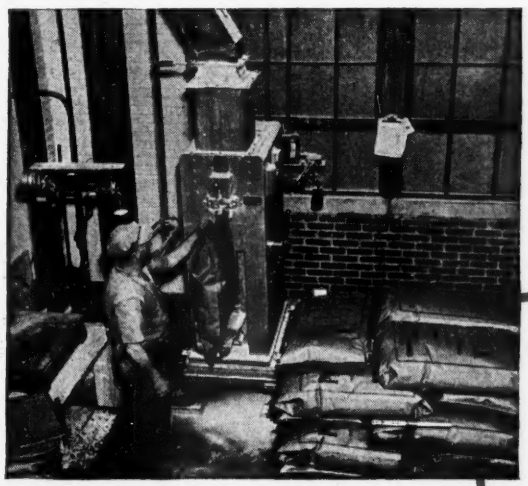
This chemical formerly was packed in 200-lb. wooden barrels. But these containers were costly, difficult to handle, and according to company officials "ate up too much valuable storage space." In addition, the filling operation was inefficient, dusty, and expensive.

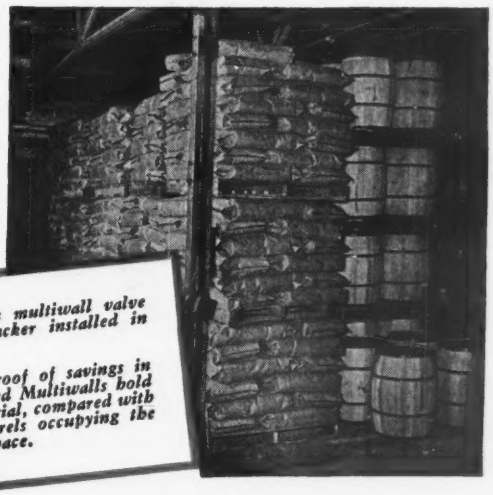
To overcome these objections, in 1946 the company installed a St. Regis automatic bag filling machine and switched to multiwall paper valve bags. These five-ply containers are made with an asphalt-laminated sheet to protect the product against moisture, and a tuck-in sleeve valve for added protection against contamination. The results of this new packaging system? These impressive three-way savings:

- ***Container costs dropped 75%***
- ***Labor costs dropped 50%***
- ***Savings in storage space totalled almost 50%***

But that's not the whole story . . . customers like Multiwalls because they save storage space and reduce handling time and labor. Plant officials are enthusiastic about Multiwalls' eye-appeal which resulted from colorful bag printing. Plant workers find Multiwalls easy to handle and praise the elimination of dust from the packaging operation.

Mail the coupon for an illustrated folder giving full details. Learn how a St. Regis Packaging System can improve your packaging operation.





Left: *One man fills multiwall valve bags on 100-LS packer installed in Heyden plant.*

Right: *Dramatic proof of savings in space . . . palletized Multiwalls hold 27,000 lbs. of material, compared with 16,000 lbs. in barrels occupying the same amount of space.*

MULTIWALL

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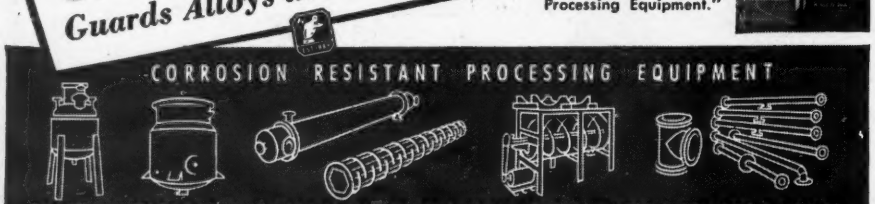


as they occurred in the whole milk, homogenized and immediately fed to a quick-freezing apparatus. The quick-frozen product is then compressed into cakes which may be reconstituted into whole milk by the addition of water.

Digest from U. S. Patent 2,412,203, issued December 10, 1946, on an application dated April 27, 1943, to Charles Brunkhurst, Middletown, N. Y.

ENGINEERING

Egg Washing Machine

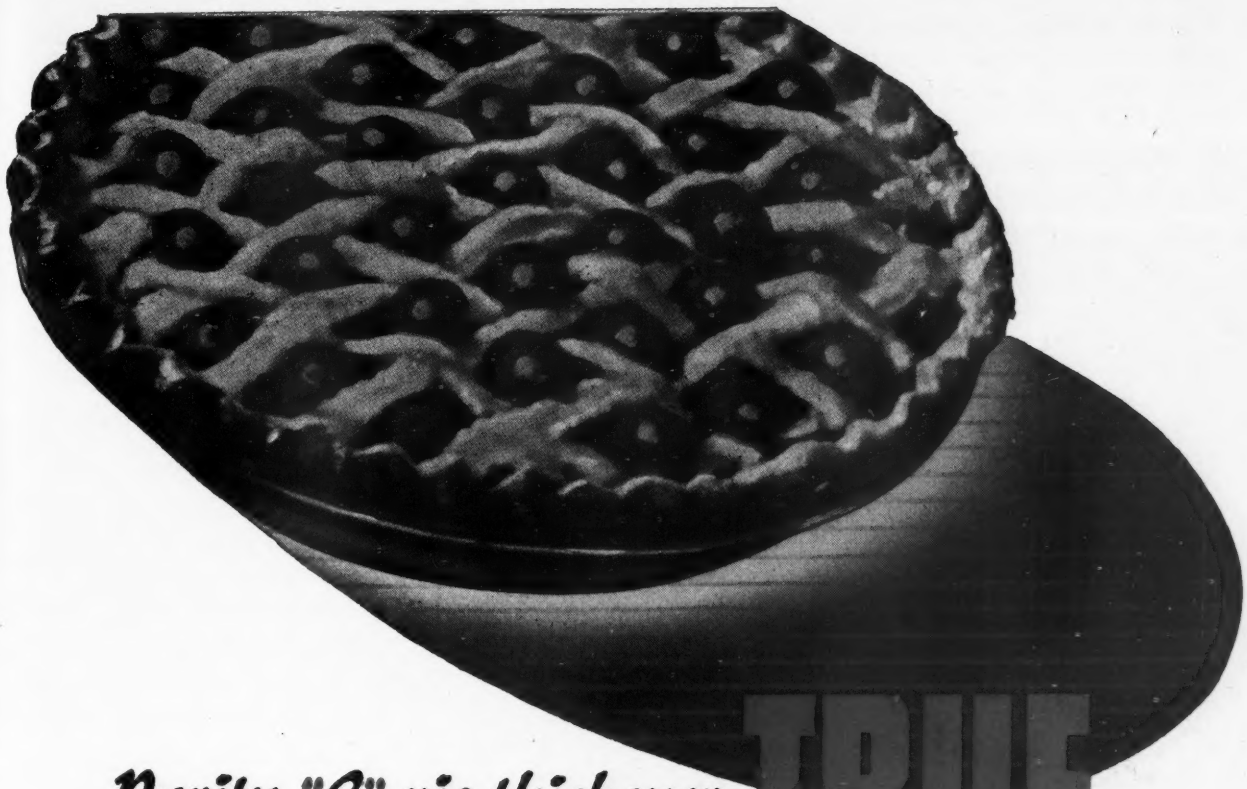
RAPID mechanical cleaning of eggs in cushioned racks that protect them from breakage during cleaning is the object of a recently patented invention. Trays of eggs are passed through a preliminary soaking tank containing cleaning solution. Above this tank is mounted the cleaning tank, and a carriage on which the eggs removed from the soaking tank are passed between rotating brushes. The tray is formed of heavy wire stock, corrugated to provide pockets or seats for the eggs. A cover, also formed of wire, supports cushioning members of sponge rubber. Eggs are arranged with their long axes transversely to the path of travel on the carriage, and are rotatively supported in their seats in the tray between the cushioning elements.

Digest from U. S. Patent 2,412,565, issued December 17, 1946, on an application dated August 23, 1943, to Roy S. Davis, Otsego, Mich.

Freezing Apparatus

A METHOD and apparatus for freezing vegetables and the like, which avoids exposure of the material to the air throughout the process is disclosed in a recent patent. The processing unit consists of a vertical elongated casing divided into blanching, freezing, and storage chambers, through which the food material can pass by gravity. The casing is connected with means of evacuating certain zones of the processing unit to freeze the material to be processed. The desired vacuum in the freezing chamber is created by a pair of steam jet ejectors in tandem between the freezing chamber and a condenser.

Material introduced into the blanching chamber at the top of the unit is treated with steam to effect inactivation of enzymes. The blanching chamber is then evacuated, and the material is dropped into the freezing chamber which is evacuated to an absolute pressure of one in. Hg. After several batches



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PURITY "C" is a starch specialty for thickening pies. It was developed to permit fruit to retain its true flavor—free of the cereal taste found in regular corn starch. It also permits fruit to retain its natural appetizing coloring.

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PURITY "C" is another product of National's Food Laboratory research that has produced a specialty starch for every baking need. National recipes that have increased sales in bakeries, hotels and restaurants are now available in our PURITY "C" Booklet. Write for your copy — NOW!

National also produces: PURITY "FL" a premium fruit pie thickener that is unexcelled for quality; MELOJEL a double-refined corn starch; FLOJEL candy starches in all accurately controlled fluidities; PURITY MOLDING STARCH properly lubricated for gum drops, etc.; PURITY GLAZE an oil-sealer for coating almonds; and PURITY "PWS" a complete salad dressing starch.

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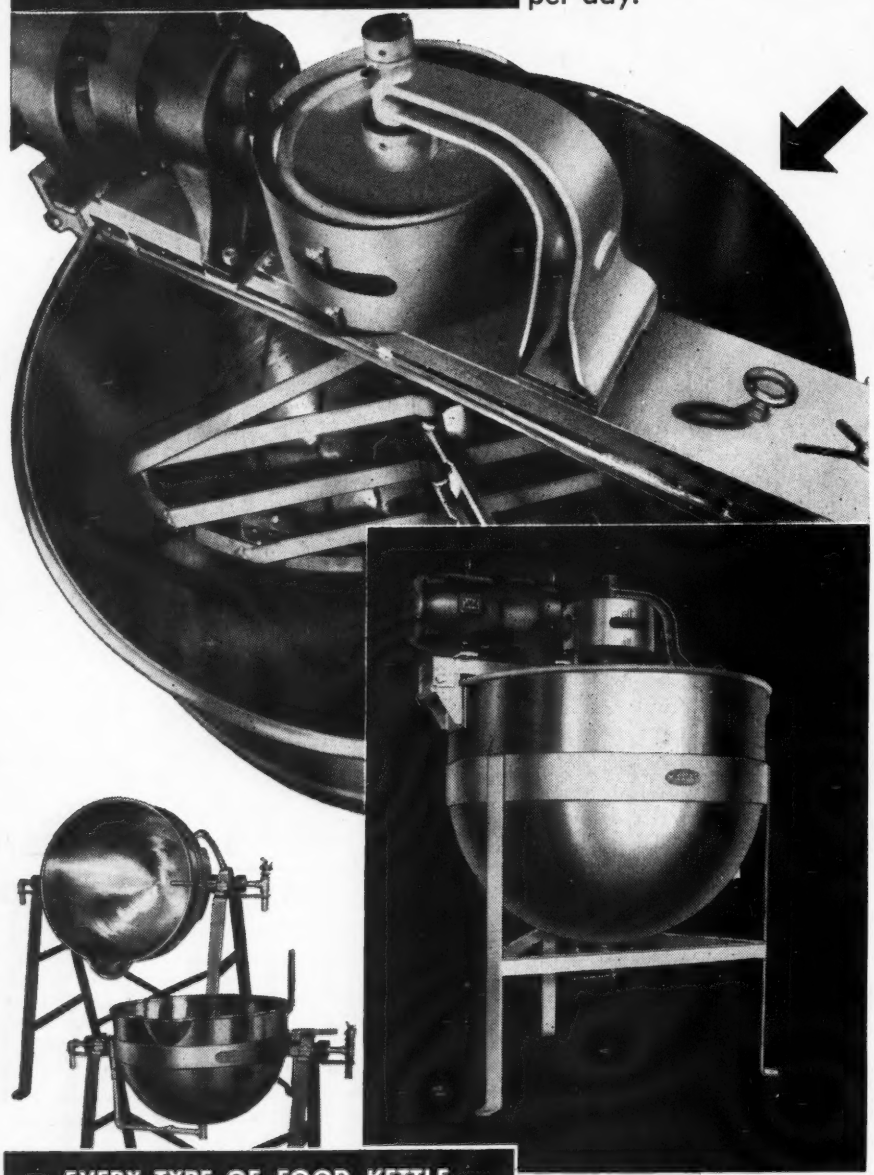

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THE KETTLE WITH THE **HAMILTON** NAME

of material have thus been blanched and frozen, the lot is dropped into the storage chamber, whence it is removed for final storage.

Digest from U. S. Patent 2,407,482, issued September 10, 1946, on an application dated October 28, 1943, to F. B. Doyle, Phillipsburg, N. J., and assigned to Ingersoll-Rand Co., New York, N. Y.

MISCELLANEOUS

Inhibiting Mold Growth

SODIUM diacetate is effective in preventing the growth and development of molds commonly found in dairy products such as butter, cheese, buttermilk, milk and products derived from milk, according to recent patent specifications. It may be incorporated directly within the range of about 0.1 to 2.0 percent by weight of the dairy product, or it may be applied as a spray or dip to the dairy product and wrapper.

Digest from U. S. Patent 2,412,596, issued December 17, 1946, on an application dated February 2, 1942, to Hans F. Bauer and Elmer F. Glabe, and assigned by mesne assignments to Stein, Hall & Co., Inc., a corporation of New York.

Gelatinized Starch

IN MAKING gelatinized starch it has been customary to heat a sweetened starch slurry to a temperature near its boiling point. The resulting product tends to retrograde, losing volume and viscosity, and developing cloudiness. According to a recent patent these disadvantages may be overcome by gelatinizing starch in the presence of a large proportion of water and starch conversion sirup solids. Water is used in the proportion of at least six to one by weight of starch, to form a free-flowing slurry when gelatinization is started and a free-flowing liquid after gelatinization is effected. Sucrose, lactose, invert sugar, dextrose or a mixture of these in addition to the sirup solids, are used as the sweetening agent in excess of the proportion of starch. The resulting product has a viscosity that may be as high as 150 percent of that obtained when sucrose alone is used. Transparency may be increased as much as 165 percent, and specific volume to 128 percent. Flavoring agents and acids, such as malic, citric, tartaric, lactic, and acetic may be added. Conventional times and temperatures are used in the process.

Digest from U. S. Patent 2,406,585, issued August 27, 1946, on an application dated July 30, 1942, to B. F. Buchanan, Leonia, N. J., and R. L. Lloyd, Laurelton, N. Y., and assigned to American Maize-Products Co.

BOOKS

Specialty Products

CHEMICAL SPECIALTIES. Compiled by H. Bennett. Published by Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y., 1946. 5½x8¾ in.; 826 pages; cloth. Price, $12.50.

This is a peculiar book in that it leaves the impression of being addressed to no one in particular. While it is aimed at the layman who is producing, or contemplates the production, of chemical specialties, such a reader is apt to find the coverage a very broad one. The chemist, on the other hand, will find much of the technical material elementary. He may be more interested in the general chapters on marketing, business principles, laws and regulations.

The formulas offered could possibly inspire new products or might suggest departures from the specialist's present procedure. The chapters and formulas include a number of food products that should be of interest to the manufacturer of food specialities, as should the sections on insecticides and cleaning materials.

Definitions

CONCISE CHEMICAL AND TECHNICAL DICTIONARY. Edited by H. Bennett. Published by Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y., 1947. 1055 pages; 6¼x9¼ in.; cloth. Price, $10.

Food manufacturers find themselves in almost daily touch with technical operations, particularly in the field of chemistry. Unless they are scientifically trained, the technical terms, involved in these contacts, place them under an immediate handicap. This volume includes about 50,000 definitions covering every field of scientific and technical development.

The book has been pointed to both the layman and the professional and defines many internationally accepted terms, which help in the understanding of the work of other countries. There is also a useful compilation of trade-name and proprietary products covering food and other fields, which includes emulsifying and wetting agents, plasticizers, detergents, accelerators, antioxidants, etc. The chemical and physical properties and applications of these products are listed as well as their chemical composition.

A number of practical tables are included, such as those on vitamin values of important raw foodstuffs, organic ring systems, chemical indicators, and temperature conversion.

Engineering Statistics

EXAMINATION OF INDUSTRIAL MEASUREMENTS. By John W. Dudley, Jr. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. 1946. 113 pages; 6¾x8½ in.; cloth. Price, $2.

Statistical methods of measuring as applied to engineering processes can produce many arguments as well as much useful information. Misuse of any of the procedures can also produce costly error. This book attempts to provide the engineer with some simple and adaptable statistical tools. It is designed to enable him to collect data that can be subjected to more elaborate analyses when such analyses are required.

Mathematics are kept to a minimum, throughout the book, and most equations are stated in forms most readily adaptable to industrial data.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the bureau responsible for its issue.

WAR DEPARTMENT RESEARCH AND DEVELOPMENT PROGRAM. Includes Quartermaster Corps food investigations in general, but not in detail. In two parts: Fiscal year 1947 and fiscal year 1948. Available free on request to War Department General Staff, Research and Development Division, Washington 25, D. C. Mimeographed.

PB BIBLIOGRAPHIES. As an aid to distribution of documents, Office of Technical Services is now issuing in mimeographed form certain bibliographies. These merely list by number, title, and price the PB documents that have been released in certain fields thought to have wide interest. Subjects covered in addition to those listed last month are Foods; Flour Milling and Bakeries; Yeast and Sugar; Confectionery, Chocolate, and Cocoa; and Refrigeration, Dehydration, Cold Stor-

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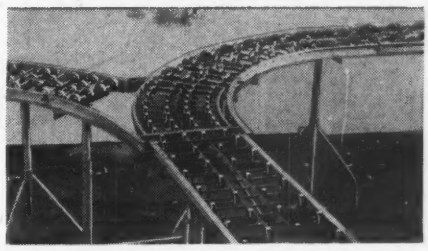

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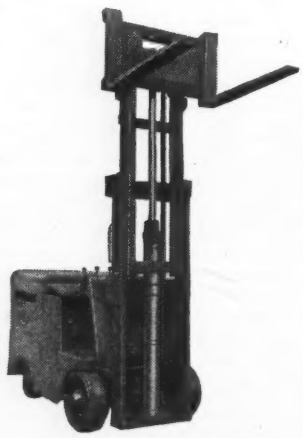

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WORLD SOIL AND FERTILIZER RESOURCES IN RELATION TO FOOD NEEDS. By Robert M. Salter. Bureau of Plant Industry, Soils, and Agricultural Engineering, Department of Agriculture, Washington 25, D. C. Unnumbered, mimeographed.

UNION WAGES AND HOURS IN THE BAKING INDUSTRY. Bureau of Labor Statics, Bulletin No. 871. Price 15 cents.

INJURIES AND ACCIDENT CAUSES IN THE BREWING INDUSTRY. Bureau of Labor Statistics, Bulletin No. 884. Price 15 cents.

EXHIBIT PICTURES FROM THE FOUR REGIONAL RESEARCH LABORATORIES. Department of Agriculture, Miscellaneous Publication No. 617. Flow sheets of new processes developed at these Labs. Price 25 cents.

FOREIGN COMMERCE AND NAVIGATION OF THE UNITED STATES FOR THE CALENDAR YEAR 1943. Volume I, Import and Export Statistics, Section A. Price $4.00. Volume I, Import and Export Statistics, Section A-Supplement. Price $1.75. Volume I, Import and Export Statistics, Section B. Price $2.00. Volume II, Export Transport Statistics. Price $2.00. Bureau of the Census. Buckram.

EXTENT OF COLLECTIVE BARGAINING AND UNION RECOGNITION, 1946. Bureau of Labor Statistics, Bulletin 865. Price 5 cents.

STATISTICAL ABSTRACT OF THE UNITED STATES, 1946. Bureau of the Census. Price $2.25. Buckram.

A SMALL PORTABLE MIST BLOWER FOR APPLYING CONCENTRATED SPRAY. By S. F. Potts and R. A. Spencer. Bureau of Entomology and Plant Quarantine, ET-234. Mimeographed.

USES OF VARIOUS DDT FORMULATIONS FOR THE CONTROL OF INSECTS AFFECTING ANIMALS. Bureau of Entomology and Plant Quarantine, E-714. Mimeographed.

REVISED FEED FORMULAS FOR CHICKENS. By Harry W. Titus, et al. Bureau of Animal Industry, IS-57. Price 5 cents.

FEDERAL SPECIFICATIONS. New or revised specifications which make up Federal Standard Stock Catalog have been issued on the following items: Cranberries; Fresh Y-C-651a. Strawberries; Fresh Y-S-726a. Endive, Escarole, and Chicory; Fresh HHH-E-516a. Parsnips; Fresh HHH-P-103a. Price 5 cents each.

PATENTS

Stabilized Sodium Acid Pyrophosphate Made by Drum Drying Monosodium Orthophosphate Solution — Eugene N. Hetzel, St. Louis, Mo., and George E. Taylor, Anniston, Ala., to Monsanto Chemical Co. No. 2,408,258. Sept. 24, 1946.

Nicotinic Acid Prepared from Nicotine Nitrate — Russell Tattershall Dean, Stamford, Conn., and Victor L. King, Bound Brook, N. J., to American Cyanamid Co., New York, N. Y. No. 2,409,345. Oct. 15, 1946.

Nuts Cracked by Means of Crushing Action to Minimize Breakage of Nut Meats Such as Thin-Shelled Walnuts—Fred F. Feldmann, San Jose, Calif. No. 2,408,510. Oct. 1, 1946.

Homogeneous Dietary Supplement Consisting of Mineral and Vitamin Nutrient Components Prepared to Be Compressible into Tablets—Carl N. Andersen, Wellesley, Mass., to Lever Bros. Co., Cambridge, Mass. No. 2,410,417. Nov. 5, 1946.

Glyceride Oils Containing Vitamins Stabilized Against Oxidative Deterioration by Emulsifying in Molasses and Heating to Over 150 Deg. F.—Sidney Musher to Musher Foundation, Inc., New York, N. Y. No. 2,410,455. Nov. 5, 1946.

Vitamin-A Active Products Made by Treating Anhydro Vitamin A with Organic Acid Converting Agent—Norris D. Embree and Edgar M. Shantz to Distillation Products, Inc., Rochester, N. Y. No. 2,410,575. Nov. 5, 1946.

Fat-Soluble Vitamin Concentrate Obtained from Glyceride Fat Containing Fat-Soluble Vitamin Through Reaction with Primary Amines, Secondary Amines and Quaternary Ammonium Bases—Edgar M. Shantz to Distillation Products, Inc., Rochester, N. Y. No. 2,410,590. Nov. 5, 1946.

Material Consisting of at Least One Liquid and at Least One Solid Dehydrated by Freezing Under Extremely High Vacuum with Agitation and Subsequent Application of Heat—Theodore R. Folsom, New York, N. Y. No. 2,411,-152. Nov. 19, 1946.

Fats and Fatty Material Mixed with Oil-Free Olive Juice or Coconut Juice and Subsequently Separated to Improve Flavor, Color or Odor—John Hood Forkner, Fresno, Calif. No. 2,411,201. Nov. 19, 1946.

Vitamin-Containing Oil Freed from Animal Tissue by Coagulating Tissue Material, Freeing of Water Content by Draining, Grinding Sufficiently to Liberate Oil without Emulsifying, and Adding Enough Water to Float Oil and Permit Its Removal—Harold E. Crowther, Laurel, Md., to Aquacide Co., Washington, D. C. No. 2,413,692. Jan. 7, 1947.

Vitamin B_1 and Riboflavin Content of Live Wet Brewer's Yeast Substantially Increased by Holding at Between 32 and 50 Deg. F. for Not Less than Seven Days—Ben Maizel to Vico Products Co., Chicago, Ill. No. 2,411,445. Nov. 19, 1946.

Pies with Flat Bottom Crust Made by Using Flexible Measuring Band Around Perimeter of Crust to Hold the Deposited Filling within Area of Crust—Lloyd J. Harriss, Kenilworth, Ill. No. 2,411,857. Dec. 3, 1946.

Starch, Suspended in Water, Treated with Caustic Alkali in Presence of Calcium Compound to Form Liquified and Stabilized Vegetable Glue—Gordon G. Pierson, Lansdale, Pa., to Perkins Glue Co., Lansdale, Pa. No. 2,413,885. Jan. 7, 1947.

Yield of Proteins Extracted from Crude Corn Gluten Increased by Treating Gluten with Organic Zein Solvent at Temperature Below Boiling Point of Solvent Preliminary to Extraction with Sodium or Potassium Hydroxide Solution—Cyril D. Evans and Chester W. Ofelt, Peoria, Ill., to United States of America. No. 2,414,195. Jan. 14, 1947.

Honey Refined by Heating Until Solid Impurities Separate Out and Agglomerate Preliminary to Separating into Solid and Liquid Phases—Arvid Erickson, San Jose, and John D. Ryan, Campbell, Calif., to Barron-Gray Packing Co., San Jose, Calif. No. 2,414,290. Jan. 14, 1947.

Liver Oils Treated for Recovery of Product Having No Vitamin A Activity but Converted into Vitamin A Active Substance by Heat Treatment—Norris D. Embree and Edgar M. Shantz, Rochester, N. Y. No. 2,414,458. Jan. 21, 1947.

Malt Syrups Containing Less Than 80 Percent Solids Stabilized by Addition of Water-Soluble, Alkali-Metal Acetates Containing Combined but Undissociated Acetic Acid—Hans F. Bauer and Elmer F. Glabe, Chicago, Ill., to Stein, Hall & Co., Inc., New York, N. Y. No. 2,415,070. Feb. 4, 1947.

Gas Content of Curd Reduced to Permit Its Separation from Whey by Centrifugal Force Preliminary to Cheese Making—Alan E. Flowers and Andrew E. Merget, Poughkeepsie, N. Y., to The De Laval Separator Co., New York, N. Y. No. 2,415,239. Feb. 4, 1947.

Cashew Nutshell Liquid Used as Base for Water-Soluble Sulphonated Compound—Ernest H. Freund and Paul Mahler to General Foods Corp., New York, N. Y. No. 2,415,347. Feb. 4, 1947.

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In salting butter, salt must dissolve with lightning speed. If the butter is on the soft side, butter salt must dissolve so quickly that overworking is avoided. Otherwise, the butter may become mottled or marbled, lose its moisture, become leaky. Yet, if the salt is not properly dissolved, the butter may be gritty. So, remember that Diamond Crystal Butter Salt dissolves completely in water at 65° F. at an average rate of 9.2 seconds.

On the other hand, there are instances where slow solubility of salt is highly important . . . such as in salting cheese. Here slow solubility prevents salt being lost in whey, producing undersalted cheese. To meet *all* these problems, we have set up definite solubility standards for Diamond Crystal Salt.

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If salt solubility enters into your processing, write to our Technical Director. He'll gladly recommend the correct grade and grain of Diamond Crystal Salt for best results. Diamond Crystal, Dept. J-15, St. Clair, Michigan.

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FEATHERWEIGHT MODEL 391

Handles bags, boxes, cartons, etc., weighing up to 125 pounds each. 4 Standard sizes—all easily moved by one man—14', 17', 20' and 23' lengths. Special sizes to suit requirements. Ask for Bulletin No. 391.

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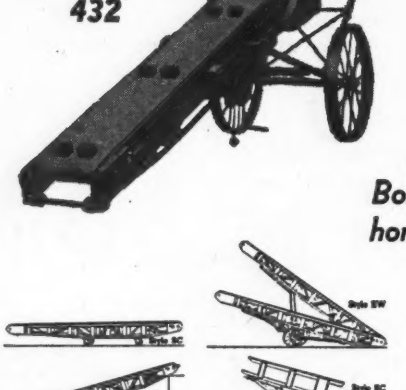
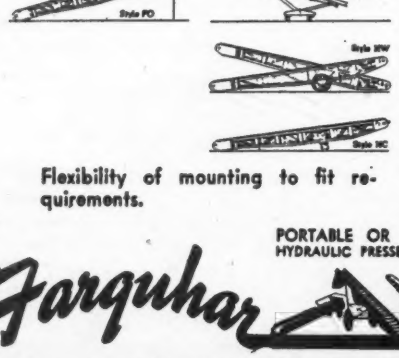


Handles bags, boxes, cartons, bales, etc., weighing up to 500 pounds. Standard sizes—18", 24" and 30" wide and lengths from 17' to 27'—other sizes to suit requirements. Ask for Bulletin No. 432.

Both models are designed for horizontal and elevating application.



Farquhar builds conveyors for every loading and unloading materials handling problem . . . stocking, loading, elevating, horizontal conveying or carrying from floor to floor . . . for any kind of loose or packaged material.

Flexibility of mounting to fit requirements.

PORTABLE OR PERMANENT MATERIAL HANDLING CONVEYORS
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Organic Chemist

(*Continued from page* 92)

citric, had a slight antioxidant effect. To the structurally-minded organic or physical chemist, this posed the problem of whether the characteristics of two distinct types of antioxidants, i.e., aliphatic and aromatic, could be combined in one molecule. The upshot was that hydrogenation of the side chain in caffeic acid, to make it more like citric acid, did result in such a structural combination, but also one which most unexpectedly had a much stronger antioxidant potency than the sum of the separate protective effects of citric and caffeic acids.

Another type of contribution which the organic chemist can make to the food industry is that of bringing into it scientific techniques or discoveries which are ordinarily regarded as being quite foreign. The objectives of the organic pharmaceutical chemist may be very different from those of the organic food chemist, but both fields of research use concepts of molecular structure. For this reason it is perhaps easier for the organic chemist to reach out into other industries for useful ideas. The value of such a common bond can be illustrated by the following experiences.

Recovery of Alkaloids

In connection with the studies of colloidal phenomena, Professor J. U. Lloyd many years ago had discovered that certain clays had a remarkable affinity for the complex alkaloids like morphine and strychnine. This discovery had had temporary practical interest during World War I when it was used to extract atropine from the Jimson weed to offset the shortage of this alkaloid caused by the blockade of Europe.

Although caffein is only distantly related in structure to the above mentioned alkaloids, there still was enough association to suggest that the adsorption of caffein on clay might solve certain technical difficulties in the purification of caffein produced from the decaffeination of coffee. Further research suggested a process whereby the conventional extraction could be accomplished without resorting to the distillation of large volumes of solvent. The caffein-bearing trichlorethylene was circulated through a filter press loaded with clay and directly back into the extraction drum until the coffee had been stripped of caffein.

GAIRanteed COMBINATION

SHIPPING CASE WITH STURDY CONSTRUCTION ·· FLOOR DISPLAY WITH DRAMATIC SALES APPEAL

BUG BLASTER
THE NEW, EASY WAY TO PROTECT YOUR FLOWERS AND VEGETABLES FROM MOST DESTRUCTIVE BUGS AND DISEASES!
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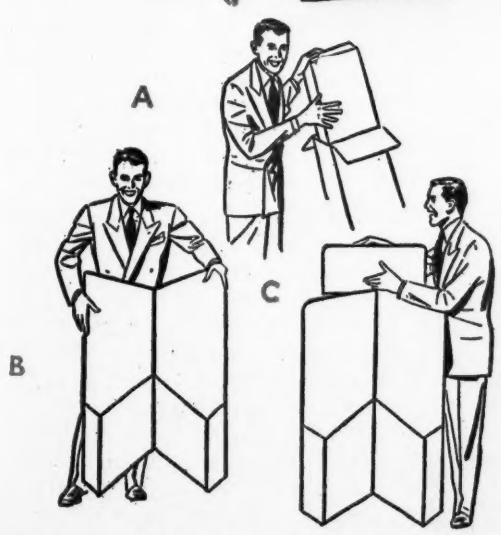

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This two-purpose GAIRanteed unit is an outstanding achievement in the channel of distribution and sales promotion for these reasons:

1. **CONSTRUCTION**——simplicity is a keynote. It's foolproof. Opens in a jiffy. Easy assembly.
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3. **ARTISTIC**——so attractive and compelling that it promotes sales consistently, day by day.
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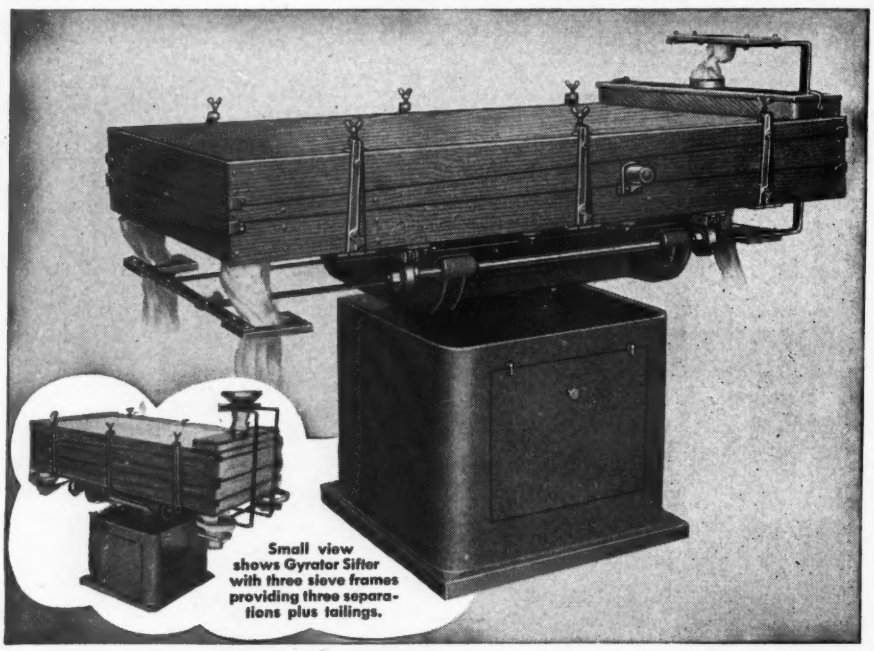
Schutz O'Neill

GYRATOR SIFTER

For sifting SPICES,
DRUGS, HERBS, CHEMICALS,
and hundreds of other ground materials.



Small view shows Gyrator Sifter with three sieve frames providing three separations plus tailings.

You can count on a Schutz-O'Neill Gyrator Sifter to turn out a near-perfect separation and deliver a large volume of uniform product free from tailings, fibre, shreds or foreign particles. The continuous whirling motion of the material as it moves forward upon the sieve's surface produces this clean separation.

Built with one to four sieve frames, the Gyrator Sifter will deliver up to four grades of product. Sieve meshes are kept free by means of light-weight, loose-sliding chains, always in motion, and knockers which constantly tap the sides of the boxes. When you change the product to be ground, sieves are quickly removable, and can be thoroughly cleaned in a few minutes. Very light running—requires only 1 to 2 H. P. motor.

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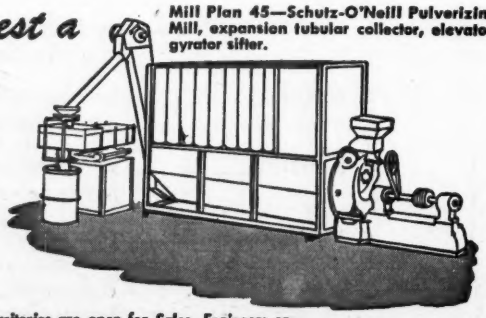
MILL PLAN

If you will write us your requirements, sending sample of products to be sifted or pulverized and output desired, our engineers will recommend the correct equipment for your use at no obligation.



Mill Plan 45—Schutz-O'Neill Pulverizing Mill, expansion tubular collector, elevator, gyrator sifter.

Some territories are open for Sales Engineers on Schutz-O'Neill products. Write, stating qualifications

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The recovery of the caffein from the clay was accomplished by washing the clay, still held in the press, with methanol. It was fortunate that methanol forms a constant boiling mixture with the trichlorethylene. Consequently it was possible to keep the trichlorethylene in the extraction drums completely free of contamination.

New Analytical Method

That this clay process was not put into commercial production but was supplanted by still better methods does not detract from the value of the transfer of technology from one domain of organic chemistry to another. Another result of the work on caffein adsorption by clay was the development of a fast and reliable analytical method for the determination of theobromine and caffein in cacao products.

Organic chemistry cannot and should not be expected to stand alone in a field of research which is as many sided as the food field. In General Foods it is very closely associated with basic research in biochemistry and physical chemistry. Within the Organic Laboratory there are individuals who devote themselves primarily to the study of plant chemistry. Analyses and isolation operations take up the majority of their time and thought. A second group is devoted to flavor chemistry because of the extreme importance which flavors have in specialty food products. A third group is studying the fundamentals of the amino acid-sugar reaction, a type of reaction which accounts for many desirable as well as undesirable changes in foods. The second and third groups employ an analytical and a synthetic approach about equally. There is also a fourth group devoted to the systematic study of processing variables in connection with organic projects that have become fairly definitely outlined as a result of basic research, but are not yet ready for technological development.

Pays for Itself

Finally, it should be emphasized that group effort is important. It is obvious from the foregoing that no individual could accomplish all of these things single-handed. Also no business executive should assume that the application of structural organic chemistry solves all of the problems of a development. The basic organic research may not account for ten percent of the total cost of a project from the original conception of an idea to its final em-

FOR THE PREVENTION OF BROWNING OF FROZEN FRUITS

ASCORBIC ACID-CITRIC ACID MIXTURE

As soon as a fruit is peeled or sliced, it is exposed to the action of atmospheric oxygen. The first result of this exposure is the oxidation of the ascorbic acid (Vitamin C) naturally present, and as soon as this has occurred certain substances also present are next attacked causing the development of a brown color. The rates at which these oxidations take place are also greatly increased by certain enzymes present in the fruit.

Since the ascorbic acid must first be oxidized before "browning" occurs, this latter can be postponed by adding additional quantities of the ascorbic acid and naturally the more that is added the longer "browning" is delayed, although with the enzymes present, to speed up the oxidation, it will eventually occur.

Experimental work carried out in the laboratories of Chas. Pfizer & Co., Inc., has demonstrated that by adding a small amount of citric acid to the fruit the enzymes, which cause rapid oxidation, are inactivated and only a relatively small amount of ascorbic acid need be added to protect cut or frozen fruits against "browning".

Chas. Pfizer & Co., Inc., now has available an ascorbic-citric acid mixture (4% ascorbic acid U.S.P., 96% citric acid anhydrous) which combines the enzyme-inactivating effect of the citric acid with the anti-oxidant effect of ascorbic acid to give better protection against the "browning" of frozen fruits *and at a lower cost.* For further information please inquire of Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 W. Grand Avenue, Chicago 10, Illinois; 605 Third Street, San Francisco 7, Calif.

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bodiment in a manufacturing process or a finished product acceptable to the consumer. The great contribution of this type of work lies in the guidance which it gives to the direction which the program of a food research organization should take. It would require very few failures in the ninety percent cost end of a development to pay for a sizable organic unit in a research organization.

—End—

Frozen Cooked Foods

(*Continued from page* 115)

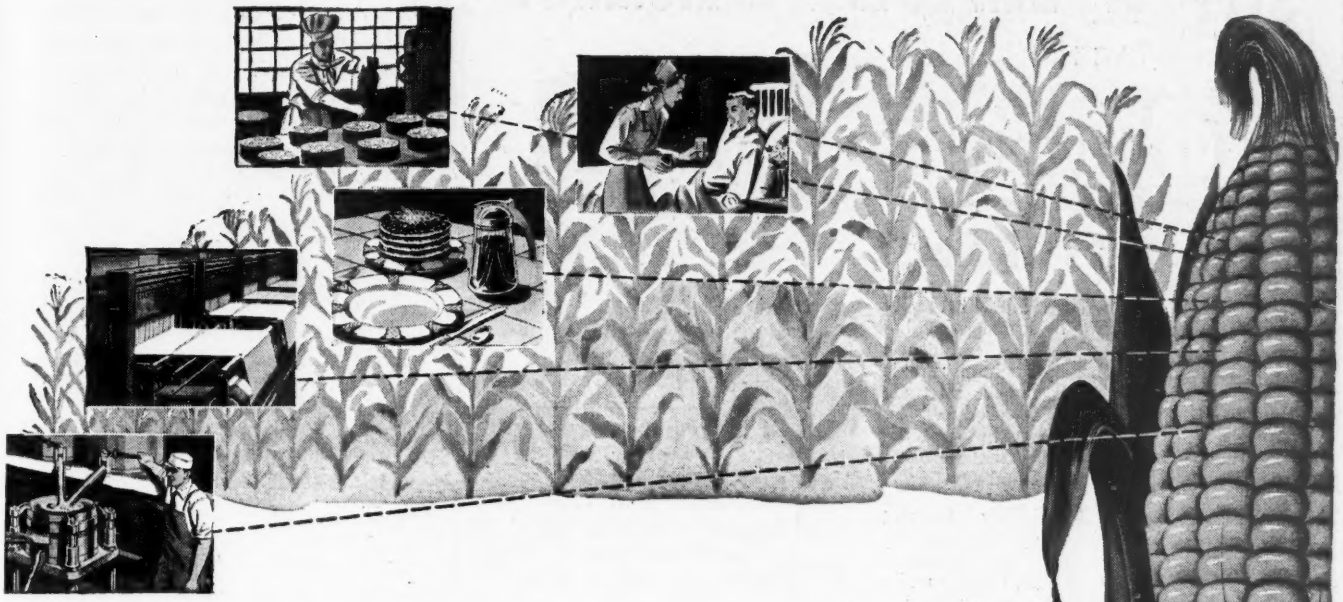
but would be rejected because it has a high M.P.N. value, indicating that the greater part of the bacteria are of fecal origin. Another, with a passable M.P.N. value, fails to meet the plate count standard. The two remaining samples exceed these two standards in both respects.

For those interested in setting up the laboratory control procedures, the plate count method of the American Public Health Association Committee on Foods (except milk), is recommended.[4] For the plate count test, food in suitable dilutions is inoculated into tryptone glucose extract agar and incubated for 72 hours at 30 deg. C. For most precooked foods, the most satisfactory dilutions are 1/100, 1/1000 and 1/10,000. The M.P.N. value is found by methods used for shellfish.[5] Samples are inoculated directly into lactose broth in Durham fermentation tubes and incubated for 24 to 48 hours at 37 deg. C. Positive tubes are confirmed by inoculating them into brilliant green bile. The M.P.N. value is calculated from Hoskin's table, which may be obtained from the A.P.H.A. headquarters in New York City.[6]

The following procedure may prove helpful in the preparation of frozen food samples for bacterial analysis: (1) Allow the product to defrost in the package for two hours at room temperature. (2) Place a 200 g. sample in a sterile Waring Blendor, and add an equal amount of sterile water. (3) Blend until thin enough to pipette, but do not allow liquid to rise to room temperature before sampling. Use wide tip-opening pipettes made by filing off a small portion of the tip on those pipettes not graduated to the tip.

Once a product is frozen, its quality is most affected by high temperature. Under storage condition

One of a series of advertisements showing the importance to American industry of the underwriting and distribution of investment securities



The Cornfield that fed a Miracle

Today the A. E. Staley Manufacturing Company is one of the largest processors of corn products in the country. In a new field, soybeans, the company has pioneered and become the largest processor in the world. From a small beginning in Baltimore in 1898, later moving to Decatur, Illinois, in 1909, the record of Staley has been one of continued growth.

This steady expansion has been based on good products, careful research and competent management assisted by sound financial planning. The professional services of Smith, Barney & Co. as underwriters and distributors of investment securities have been repeatedly used to provide the capital for growth and for a sound financial structure.

Westward for corn

In 1909 Augustus E. Staley went West, like many before and after him. He did not seek gold and he did not find it. But he did seek *corn*, the golden corn of the fertile mid-West. And in finding it he began the development of the A. E. Staley Manufacturing Company on a national scale. Today at Decatur the Staley plants, comprising 52 buildings, cover 320 acres and annual sales are over one hundred million dollars.

From corn to a miracle

Augustus E. Staley knew corn better than most men, was alert to its possibilities. He foresaw the versatility of corn—versatility developed by research. Out of this have come many things—even the development of a special nutrient for increasing the production of the miracle drug, penicillin. Today, the original box of corn starch is but one of many Staley products. Now manufacturers of candy, powder, ice cream, jellies, soap, rayon, paints—tobacco growers, fruit canners, leather tanners, paper mills—all use Staley products. One such product of research, "Sweetose," an especially sweet corn syrup, has opened up new markets, especially in the food processing industries where it is competing effectively with sugar and other sweetening agents. The growth of Staley has meant new and better products to improve the nation's living standards and the creation of thousands of new jobs.

The way to leadership

Growth of A. E. Staley Manufacturing Company from a local enterprise to a national one has been due to that combination of balanced policies which lifts a company to national leadership in its industry. In the formulation and execution of its financial program Staley has found the experience and facilities of Smith, Barney & Co. particularly valuable. These services have ranged from underwriting securities to provide funds for working capital and for redemption of outstanding bonds — to distributing large blocks of privately-held stocks, bringing to both company and security holders the benefits of a wider public investment interest.

The advantages derived from the relationship between Staley and Smith, Barney have been duplicated often in the history of this firm and its antecedent firms; in the future we hope to render equally valuable service to others.

For more of the Staley story

To tell you more of the story of this company, we have prepared a booklet, "An Analysis of the A. E. Staley Manufacturing Company." A copy may be obtained on request to this firm, 14 Wall Street, New York 5, N.Y., Department AR.

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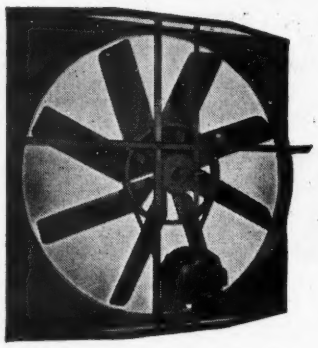

A COOLAIR FAN INSTALLATION may be your solution to summer-time-lag in efficiency on the part of employees. Especially in the heat of summer it is important to immediately remove all trace of fumes, odors and heat produced by equipment. Workers cannot be expected to produce to the fullest extent of their ability unless this is done.

PRECISION-BUILT Coolair Exhaust Fans are available in many sizes, making possible a tailored-to-fit installation in your plant. Coolair Dealers, trained under factory supervision, are equipped with precise knowledge in the planning and application of these fans. Investigate now by calling in *your* Coolair dealer for a survey — no obligation.

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Pioneer Manufacturers of V-Belt Drive Exhaust Fans

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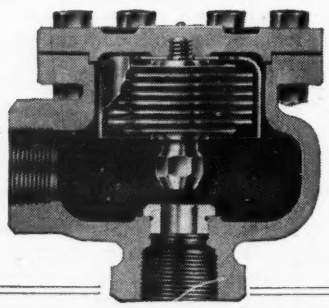
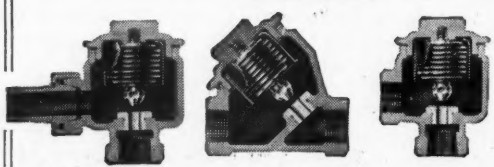
with Nicholson "POSITIVE ACTION" STEAM TRAPS

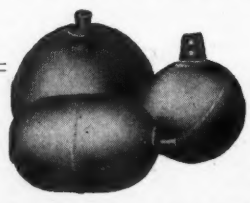


Featuring 2 to 6 times average drainage capacity, as well as freedom from air-binding, freeze-ups and water-logging, Nicholson traps afford a positive fast action that increasingly recommends them for improving heat control in food processing.



Nicholson thermostatic steam traps are furnished in 5 types for any processing application. Sizes 1/4" to 2"; pressures to 225 lbs.

BULLETIN 544 or see Food Industries Catalog



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where temperature fluctuations are frequent and marked, it does not take long to convert a quick-frozen to a slow-frozen product, to break emulsions, and to show other evidence of quality impairment.

When temperatures get into the defrosting range, packages may become wet with juices and messy. If such products are refrozen by the retailer or housewife, their shelf-life has been reduced to a negligible span.

Accordingly a 0 deg. F. "pipeline" from the freezing plant to the low temperature space in the consumer's kitchen is essential to assure the continued growth of the frozen food industry.

Management's Responsibility

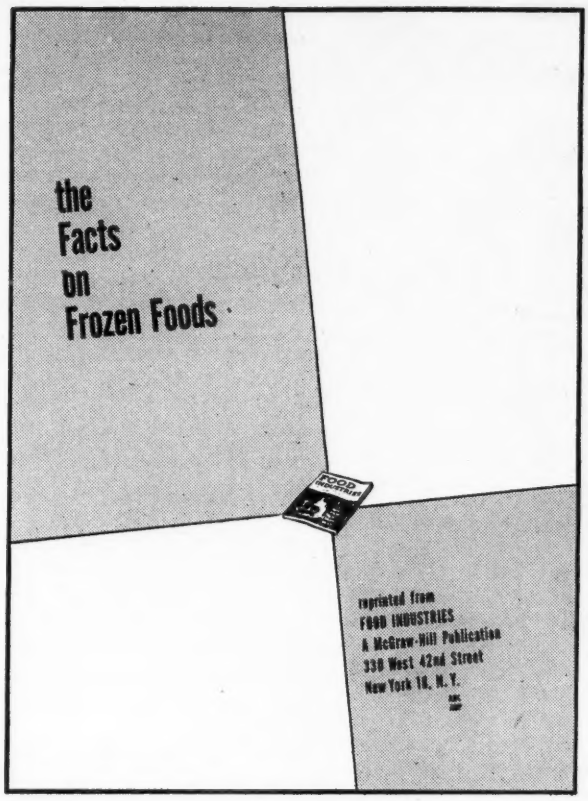
Since quality control must extend from the purchase of raw material to the distribution of the product to the consumer's home, responsibility must not rest on a single operating department such as procurement, processing, or sales. Instead, quality control should be the responsibility of management, and the quality control director should report directly to the president of the company. The latter should decide, for example, whether or not to cut corners when operating departments complain that controls are too costly.

If the controls necessary to counterbalance poor equipment make the cost prohibitive, then it is uneconomical to manufacture the product. The necessary investment in equipment should be made or the product discontinued. Company policy cannot equivocate on this point, because the good name of the company is at stake. It is better not to pack a product at all than to do a poor job.

An industry cannot prosper if the quality of its product cannot always be guaranteed. The integrated system sponsored by the Frozen Food Foundation and operated by a group of large city department stores, is steadily closing the danger gap in the distribution of frozen foods. These stores will not only provide consumers with low-temperature storage cabinets for the kitchen, but they will also deliver the frozen food to the kitchen in refrigerated trucks or containers.

References

1. B. F. Daubert and H. E. Longnecker. The Role of Antioxidants in Flavor Problems. *Food Technology*, 1:7-10, 1947.
2. R. B. Haines. The Effect of Freezing on Bacteria. *Proceedings Royal Society*, Series B, 124:451-463, 1938.
3. C. S. McClesky and W. N. Christopher. Some Factors Influencing the Survival of Pathogenic Bacteria in Cold-Pack Strawberries. *Food Research*, 6:327-333, 1941.



FOOD INDUSTRIES

the Facts on Frozen Foods

CONTAINS THE FOLLOWING REFERENCE MATERIAL ON FROZEN FOOD PROCESSING, DISTRIBUTION AND MARKETING:

(1) FOOD INDUSTRIES' REPORTS ON FREEZING contains charts by commodities and producing areas showing frozen food production of fruit, vegetable and fishery products since 1937 with a projection of production to 1948.

(2) FROZEN FOOD REPORT NO. 2, PART I — transportation, warehousing, frozen food distributional facilities, maps and tables.

(3) FROZEN FOOD REPORT NO. 2, PART II — frozen food marketing areas, map and tables.

(4) FOOD INDUSTRIES' DIRECTORY OF FROZEN FOOD PROCESSORS AND DISTRIBUTORS — an alphabetical list of frozen food processors, showing location of offices and plants, company executives, commodities processed, type of freezing system, type and size of packages; cross indexed to facilitate locating packers of any type of product, and a geographical listing of frozen food distributors.

(5) "SO YOU ARE GOING INTO FREEZING?" — What data should a processor have before entering into the production and distribution of frozen foods? Sound answers to a host of questions will be needed; therefore, a check list questionnaire is presented as a guide. It will aid manufacturers and distributors in evaluating problems and opportunities in the frozen food field.

(6) THE FREEZER LOCKER PLANT IS GOING COMMERCIAL — This article discusses the trend of locker plants toward commercial freezing.

(7) "FLASH FREEZING" OF FOODS — a comprehensive description of one of the most recently developed processes for rapid vacuum freezing of foods.

PRICES *

In lots	1 — 9	$3.00 each
In lots	10 — 99	2.50 each
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the Facts on Frozen Foods

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100% AUTOMATIC
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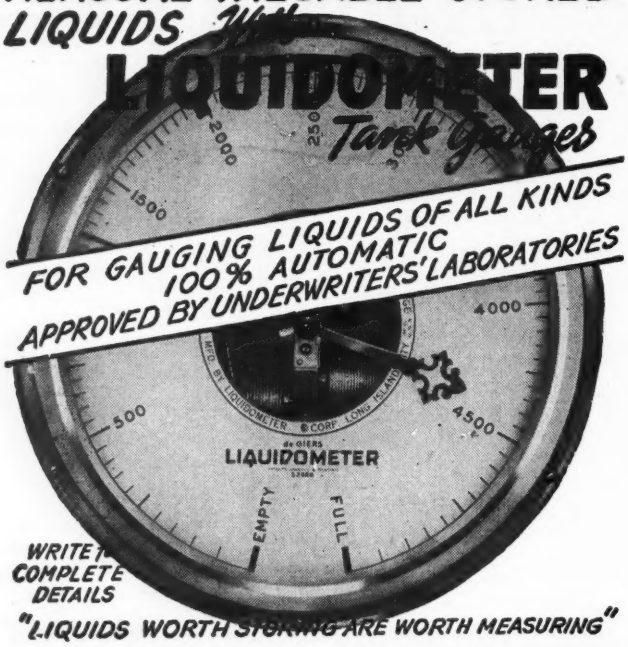

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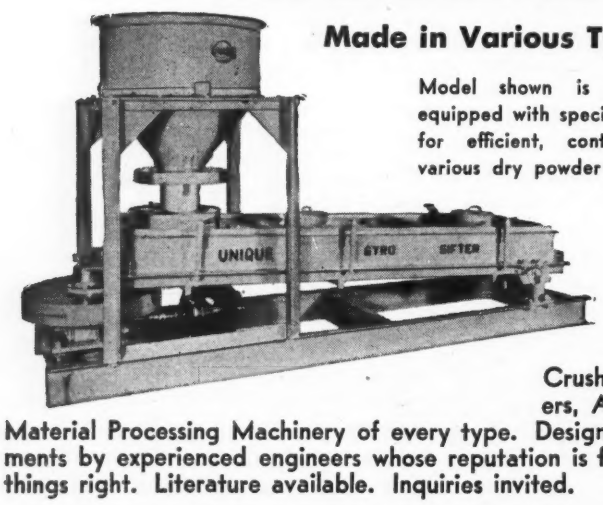

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30 CHURCH ST., NEW YORK 7, N. Y.

4. H. E. Goresline, Microbiological Examination of Foods. *American Journal of Public Health*, 36:332-335, 1946.
5. U. S. Public Health Service. A Manual of Recommended Practice for the Sanitary Control of the Shellfish Industry, Sept. 1, 1944.
6. J. K. Hoskins, Most Probable Numbers for Evaluation of Coli-Aerogenes Tests by Fermentation Tube Method. Public Health Reports, 49:393, 1934.

—End—

Electronic

(*Continued from page* 126)

tainer tend to make this method impractical.

"Among the difficulties encountered were local heating, arcing and burning which resulted from poor contact between the metal ends and the product being heated. The slower the heating, the less trouble encountered in this respect. It should be noted also that any local overheating resulted in the development of high pressure in the container which usually forced an end from the container.

"Since the product had to be in contact with the metal ends, the container was processed on its side and the headspace had to be on the side of the container. This resulted in a poor appearance and excessive free liquid in a solid product like luncheon meat.

"When brine was used, it was found that it had to have about the same electrical conductivity as the solid product or uneven heating resulted.

"The immersion of the container in hot water for the holding or sterilizing period was deemed necessary because lower temperatures were obtained in the product near the container walls than in the center of the product during this period. These lower temperatures resulted from heat lost to the container, the glass walls of which absorbed very little electronic energy, and to radiation and conduction losses during the holding period. Furthermore, since the outer portions of the product were cooled first during the cooling period, they actually received a shorter holding time than the center of the product. By immersing the container in water at a temperature a few degrees higher than that in the center of the product it was possible to equalize the sterilizing treatment given the inner and outer portions of the product.

"Fairly uniform heating of the homogeneous products was obtained in both series of tests, although when radio frequency power was applied to the side of a beaker the

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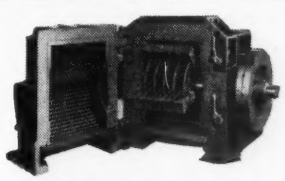
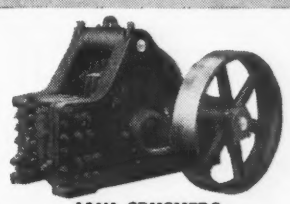


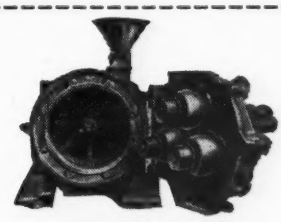
SWING-SLEDGE MILLS

for coarse and medium reduction (1" to 20 mesh). Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.



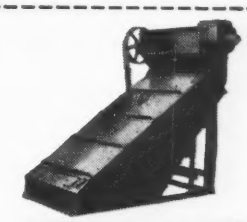
JAW CRUSHERS

for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



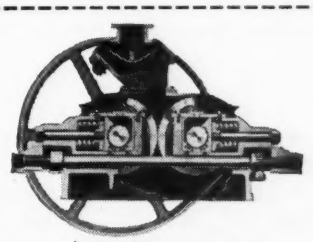
RING-ROLL MILLS

for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



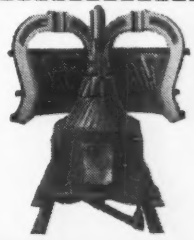
MOTO-VIBRO SCREENS

screen anything screenable. Classified vibrations. Unit construction — any capacity. Open door accessibility. Open and closed models with or without feeders. Many types and sizes — range of work ½ inch to 60 mesh.



CRUSHING ROLLS

for granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8x5 to 38x20. The standard for abrasives.



ROTARY FINE CRUSHERS

for intermediate and fine reduction (1" to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.

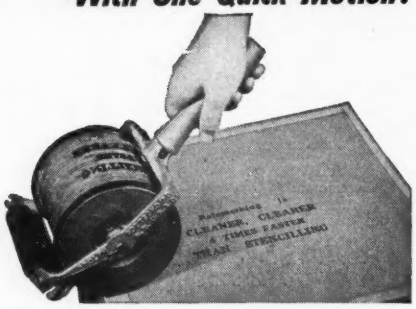
MARKS ANY SURFACE

With One Quick Motion!

INEXPENSIVE

ROLAMARKER

MAKES CLEANER, SHARPER IMPRINTS *FOUR TIMES* *FASTER* THAN STENCILLING



Out goes stencilling—in comes ROLAMARKING . . . the new, quicker way to mark names, addresses, content or shipping information on corrugated containers . . . plastic, metal, wood, paper, fabric . . . even on *filled paper bags.* A time-saver wherever twelve or more units require the same mark, ROLAMARKER makes a permanent, more legible imprint in half the space of stencil marks . . . with only one quick motion!

ROLAMARKER uses interchangeable locked-base rubber type . . . makes changing of imprint legends quick and easy. ROLAMARKER models in three different sizes afford imprints up to 5"x12". Write for complete information today.

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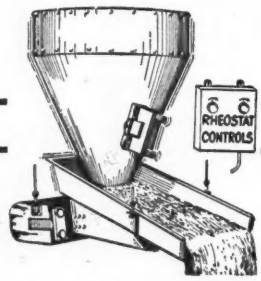
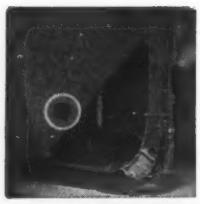
191 Duane St. New York 13, N. Y.

—MACHINES TO MARK WHATEVER YOU MAKE—

Efficient Material Handling

with SYNTRON





"Pulsating Magnet"

ELECTRIC VIBRATORS

Assuring free-flowing bins, hoppers and chutes. Prevent arching and plugging. Eight models — for all sizes and shapes of bins.

"Vibra-Flow"

VIBRATORY FEEDERS

Controlling the feed of bulk materials — hot or cold, dry or damp, a fine powder or big lump — to processing equipment.

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heating was so slow that the temperature could have evened up to a considerable extent by conduction and radiation from the surface. Heating of non-homogeneous products, such as meat containing layers of fat, was far from uniform. In one test where fresh ham was being heated, a temperature of about 260 deg. F. was indicated by one thermometer, while another a little over an inch away indicated a temperature of only 190 deg. F. On examination of the meat, some of the fat was found to be scorched, while part of the lean was still raw."

The generating equipment used in these studies was loaned by the Radio Corporation of America, and several of their engineers assisted in the studies.

As indicated by Moyer and Stotz,[16] it is true that some of the problems, such as non-uniform heating, arcing and the need for metal contact with the food, might be overcome by use of higher frequency equipment properly coupled to the product. Other problems, such as the need for super-imposed pressure, the need for a non-shielding hermetic container, loss of heat from the walls of the container and a suitable means of cooling the product in the pressure chamber, would remain. Furthermore, there is no evidence that high frequency generators of several hundred kw. power output will be available in the near future.

Conclusions

Quotation of a portion of a recent article by Sherman[17] illustrates a rational point of view. Under the heading, "Popular Misconceptions," he states, "Many extravagant and unfounded statements about electronic heating have been publicized by well-meaning but not too well informed persons. Many such statements were attempts to clothe a personal hope or fear in scientific garb and so impress the layman. Some of the hopeful ones may possibly be fulfilled by advances in electronic heat today.

Returning to the criteria of a successful industrial process, it is apparent that much further scientific study is necessary to establish any basis for the sterilization of canned foods by irradiation without heat. The possible use of r.f. heating as a means of sterilization is on a more definitely established scientific basis, but many practical problems remain to be solved for successful application. Costs appear high enough to cast doubt on profitable competition with fresh or frozen foods as well as foods proc-

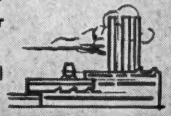
Motor or Pulley Drive Optional

The Zenith Pulp Press, with capacity up to 26 tons per hour, thoroughly dewaters wet pulps and slurries such as:

Beet Pulp • Citrus Wastes • Tomato Pomace • Cherries • Corn Fibre • Paper Pulp • Reclaimed Rubber, etc.

Heavy screw-type spindle applies smooth, continuous pressure, forces pulp or slurry against selective resistance. Rifle drilled resistors permit use of steam when necessary. Minutely perforated screens assure efficient drainage, hold pulp losses to minimum. Ball thrust bearings and oversize shaft bearings reduce power load.

New uses for the remarkably efficient, profitable Zenith Pulp Press are being constantly developed. An experimental press is available for trial in your plant.



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horizontal plate
FILTERS

. . . here's the story:

A FEW OF MANY PRODUCTS THAT CAN BE FILTERED WITH SPARKLERS

Acids
Alcohols
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Candy scrap
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Extracts
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Gums
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Molasses
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Resins
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Soap, liquid
Syrups
Varnishes
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★ Sparkler Horizontal Plate Filters handle any liquid from heavy varnishes to light alcohols.

★ Equally efficient performance on intermittent or continuous operation, under a wide range of temperature, pressure and viscosity conditions.

★ Equally effective whether removing carbons and contact clays or clarifying and polishing with filter aids.

★ Patented Scavenger Plate permits *complete* batch filtration. (It's virtually an auxilliary filter with an independent control valve.)

★ Unexcelled filter cake stability — no slipping or breaking.

. . . why?

Because filter media are supported on a horizontal plane and filter aids floated into position uniformly; filtration takes place uniformly over entire filtering areas. Flow through filter is always *with* gravity.

Sparkler Filtration Is *Engineered* Filtration—we invite correspondence on your problem. You will receive the advice of filtration scientists with a quarter of a century of experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

Vitamin A Shortage? The Answer Is . . .

CAROTENE

Scarcity of Sharks Cuts Vitamin Supply

WASHINGTON, Jan. 18. (AP) James M. Lemon, chief of the technical branch of the Fish and Wildlife Service, said today a scarcity of sharks is threatening the nation's supply of vitamin A. "The truth is," Lemon told a reporter, "our sources of supply for vitamin A are drying up—and this is a vitamin that has not yet successfully been synthesized."

ENRICHES AS IT COLORS

In addition to its Vitamin A activity, Carotene imparts the rich, natural color found in butter and carrots. It gives sales appeal to your product.

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Carotene has no fishy odor or taste. Potencies up to 1,350,000 units per gram.

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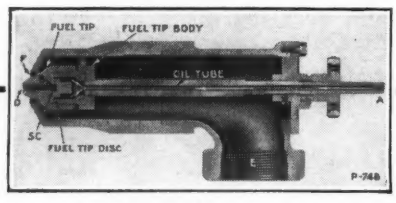
FIRE YOUR PURIFIERS, EVAPORATORS, DRYERS and CHAR KILNS with

NATIONAL AIROIL FUEL OIL - GAS BURNERS

TYPE "LAP" OIL BURNERS



Type "LAP" Oil Burners (made in seven sizes) use low air pressure for atomization; have an extremely wide clean firing range in each size; and can be readily adjusted to produce a sharp, intense oxidizing flame or a soft, reducing flame. They are of rugged construction; easy to operate; and can be quickly repaired with parts of the same size interchangeable.

Type "LAP" Oil Burners are fully described in Bulletin 65. Write for it, today.

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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

essed by other means. Further study of the entire problem appears to be justified and it is likely that electronics will find increasing applications in other phases of the food industry.

References

1. Effect of High Frequency Fields on Micro-Organisms, Hugh Fleming, *Electrical Engineering*, 18, Jan. 1944.
2. Effect of Short Electro-Magnetic Waves on Bacteria, F. Hasché and H. Leumig, *Deut. Med. Woch.*, 61, 1193-95, 1935; *Bul. Hygiene*, 10, 812, Dec. 1935.
3. The Biological Action of Ultrahigh Frequency Currents—Further Studies, R. A. Hicks and W. T. Szymanowski, *J. Infectious Diseases*, 50, 466, 1932; *Chem. Abs.*, 26, 5645, 1932.
4. Possibilities in Electronic Sterilization, H. A. Benjamin and O. F. Ecklund, *Supplement to National Canners Association Information Letter*, No. 1073, 96, Feb. 12, 1946; *Food Industries*, 18, 523, April 1946.
5. Some Experiments with High Voltage Cathode Rays Outside the Generating Tube, W. D. Coolidge and C. N. Moore, *J. Franklin Inst.*, 202, 722-35, 1926; *Chem. Abs.* 21, 1056, 1927.
6. Lethal and Dissociative Effects of X-rays on Bacteria, Sol Haberman and L. D. Ellsworth, *J. Bacteriology*, 483-503, Oct. 1940.
7. The Bactericidal Action of X-rays, Neutrons and Radioactive Radiation, D. E. Lea, R. B. Haines and E. Bretscher, *J. Hygiene*, 41, 1-16, Jan. 1941.
8. Action of X-rays on Certain Bacteria, A. T. Pugsley, T. H. Oddie and C. E. Eddy, *Proc. Roy. Soc.* (London), *B118*, 276-98, 1935; *Chem. Abs.*, 29, 7374, 1935.
9. Further Studies of the Effect of Radium Upon Bacteria, R. R. Spencer, *U. S. Pub. Health Repts.*, 50, 1642-55, 1935; *Chem. Abs.*, 30, 1084, 1936.
10. Basic Theory and Limitations of High Frequency Heating Equipment, T. P. Kinn, *Proceedings Institute of Food Technologists* (in press).
11. Heating Wood with Radio Frequency Power, J. P. Taylor, *Transactions of the A.S.M.E.*, 201, April 1943.
12. Use of Dielectric Heating for Sterilization, Pasteurization, Cooking and Enzyme Control in Foods and Drugs, W. Wenger, *Electronics*, 18, 154, March 1945.
13. Electronic Cooking and Sterilization of Foods, V. W. Sherman, *Electronics*, 17, 150, July 1944.
14. Radio-Frequency Electricity in Power Applications, John P. Taylor, *Electrical World*, October 2, 1943.
15. U. S. Patent 1,911,879, George S. Bohart, May 30, 1933.
16. Electronic Blanching of Vegetables, J. C. Moyer and E. Stotz, *Science*, 102, 68-69, July 20, 1945.
17. Electronic Heat in the Food Industries, V. W. Sherman, *Food Industries*, 18, 506, April 1946.

—End—

High Vacuum

(*Continued from page* 112)

This captures most of the escaping water vapor, reduces the huge volume to small figures, and is a very effective device—provided the ice is constantly scraped off the refrigerated walls, for ice is a very poor conductor of heat.

The necessity for refrigerating the vapor traps will account for a part of the 72 tons refrigerating capacity at the Plymouth plant.

It is this so-called "rotary condenser" process developed by N.R.C. that is employed in nearly all of the large penicillin plants in the world.

DON'T WORRY

about conversion to glass

CONVERTING to glass can mean some new problems for you. For example, you have to maintain more precise control of temperature and pressure than when you are processing tin containers. A practical solution is the Taylor No. 2C Automatic Retort Control System. It holds pressures within plus or minus one pound and temperatures within plus or minus one degree!

The engineering experience that went into this dependable control system began when we helped design one of the world's first glass packing hookups 16 years ago. The 2C Automatic Retort Control System saves you money in two important ways.

No blown caps due to improper processing.

It assures uniformly high quality by practically eliminating over-or-under cooking.

For complete details ask your Taylor Field Engineer.

Or write us today. We're ready and anxious to help you beat rising costs with Taylor Accuracy! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

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MEAN
ACCURACY FIRST
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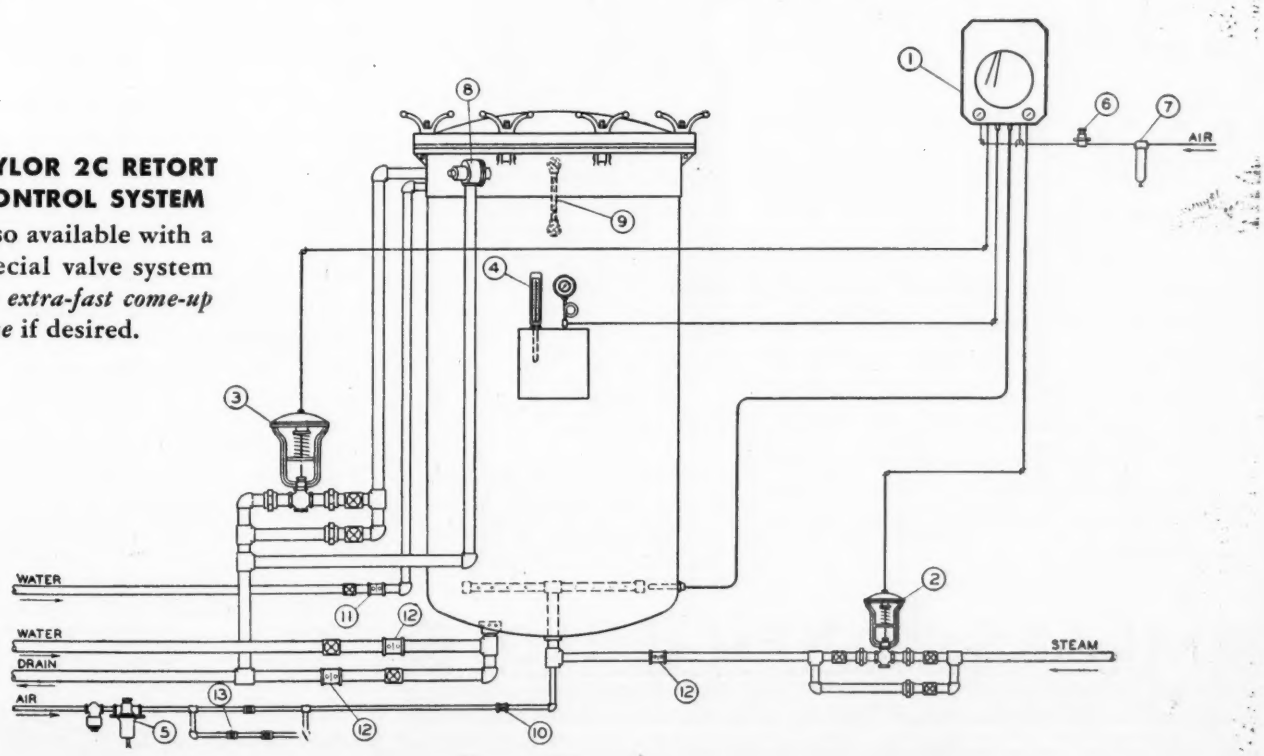
TAYLOR 2C RETORT CONTROL SYSTEM
Also available with a special valve system for *extra-fast come-up time* if desired.



Whatever the Process

- FREEZING
- CANNING
- DEHYDRATING
- PICKLING

Use LA PORTE FLEXIBLE STEEL CONVEYOR BELTING

Features that make La Porte Flexible Steel Conveyor Belting adaptable to all processing and packaging operations are: (1) its strong steel mesh construction that resists loading impacts and prevents stretching, weaving, creeping and jumping; (2) its porous structure that permits circulation of air and liquids around products in process . . . allowing drainage and facilitating cleaning and sterilization; (3) its non-corrosive metal that needs no special dressing and is not affected by steam or extreme temperatures.

Ask your Supplier TODAY for La Porte Conveyor Belting. It is available in any length— almost any width.

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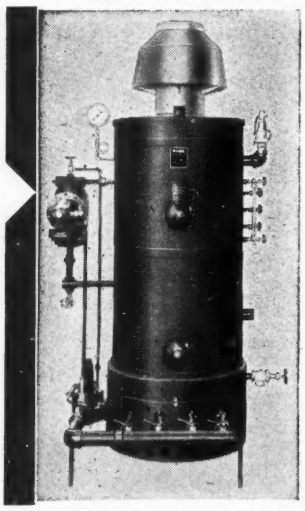
the **KANE**

AUTOMATIC GAS-FIRED

STEAM BOILER

- - - - - - - A RELIABLE, TROUBLE-FREE SOURCE OF CLEAN STEAM . . .

Compact, self-contained, and "tailor-made" for your job . . . that includes: the study and solution of your problem; the correctly sized and constructed KANE Automatic, Gas-Fired Boiler; the M-K-O Automatic Boiler-Feed to provide a constant water level for highest boiler efficiency.



The KANE Boiler is built, in sizes 1 to 30 HP., to A.S.M.E. specifications for operating pressures up to 100 lbs. Special boilers for higher pressures built to order.

Although current demands cannot be supplied immediately, we'll try to fill your urgent needs as soon as we can.

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1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.
FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE.

Unlike other methods of reducing heat sensitive liquid solutions to a dry powder by sublimation of the moisture in a vacuum at low temperatures, the method used at Vacuum Foods Corp. evaporates the liquid to dryness without prior freezing. Concentrate at 50 deg. Brix is sprayed at room temperature onto the interior walls of the drying columns. Gentle heat is supplied to the walls by warm water to supply the latent heat of evaporation.

Each drying column is operated as a batch unit, unlike the concentrating columns that operate continuously. In 6 hours the drying cycle is complete. But powder is dumped by a special device into a vacuum dolly or container, shown in Fig. 6, from some one of the driers approximately every half-hour. The powder, containing only 1.5 percent of moisture, is so hygroscopic that it is taken in the vacuum dolly to the air conditioned packaging room where a relative humidity of about 20 percent is maintained by a Bryant silica gel dehumidifying unit.

Packaging the Powder

To dump the heavy vacuum dolly, into which the powder is delivered by drying columns, it is hoisted and turned into a hopper feeding into a Rotex sifter to remove any lumps. The fines are conveyed to an auger-type filler which fill 11.5 and 2 oz. of powder into No. 2½ and baby food cans, respectively. The latter are run through a clincher to hold the lids loosely in place while they are run into a vacuum box where the air is pumped out down to 27-28 in. of mercury pressure. The vacuum is relieved by commercially pure nitrogen that enters the cans around the clinched lids. Cans are then double seamed and cased, ready for shipment. The closing machines are American Can Co. equipment.

Plant Operating Problems

The process sounds very simple in the telling but the engineering of the entire job has been exceedingly complex and the plant itself cost about $2,500,000. In order to keep down the capital investment the plant is designed to operate 24 hours a day with three shifts of operation. It is necessary to shut the entire place down, however, every 36 hours for a complete cleanup to avoid bacterial buildup. This cleanup is normally completed in four hours.

As originally laid out, the plant could process 5000 boxes (90 lb.

wrap-around **uniforms**

—a woman's first choice in **work wear**

No dressing rooms needed *where wrap-arounds are used. They're on and off in a jiffy . . . protect street clothes from dirt and wear. Sturdily made of white Sanforized cotton, they launder beautifully . . . help keep your women spic and span. Wrap-around style (#317) gives twice the service from every laundering because front is reversible. Ideal for cafeteria workers, candy factories, canning or other food processing plants, dairies, perfume or drug plants, laboratory wear . . . or wherever women are employed in light manufacturing. Specify button-back or tie belt in ordering.*

- *18 other styles to choose from.*
- *Send for complete style file.*

STYLE #67
Hoover-type

STYLE #317
Reversible front

RANDLES MANUFACTURING CO., OGDENSBURG, N. Y.

Leading Food Processors Use

Steinlite

MOISTURE TESTER

One important application of the Steinlte One Minute Moisture Tester is the testing of ingredients of food products. It is being used by many of the leading food processors. It has demonstrated its value in testing nuts, cocoa, dehydrated foods, flour, and other special products.

Steinlite is calibrated against the established laboratory method considered as official for the particular product. It is guaranteed to check within .25 of 1% of the method against which calibration was made. Steinlite functions on the principle that the radio frequency impedance of the material changes with its moisture content. For production work as well as laboratory. Write for complete details.

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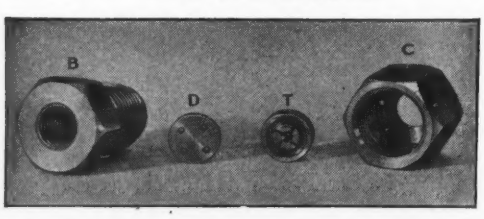
SPRAY DRYING?

Have you tried Monarch H-466 *Carboloy Cemented Carbide* nozzles?

This nozzle is specially designed for Spray Drying work, and for extra long life, the parts subject to wear or erosion are made of Carboloy Cemented Carbide. Other parts are made of 18-8 stainless steel to resist corrosion.

Plants powdering milk, eggs, coffee, molasses, etc., report nozzle life of 50 to 100 times that of nozzles of ordinary materials. Think of the savings resulting from the elimination of "down" time alone!

Write for Catalog 6-A



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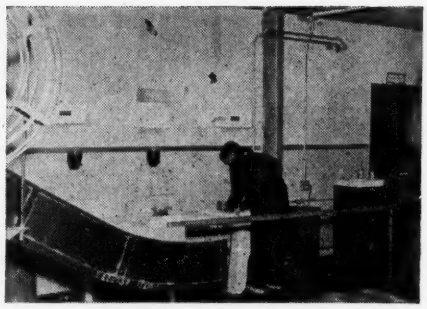

Fig. 8. Plant sanitation is emphasized everywhere. Employees leaving toilet (right) must use the wash basins.

each) of oranges in 20 hours, but with the second battery of 14 concentrating columns now installed, the capacity is more than doubled and 450 tons of oranges, or 48,000 gal. of juice a day can be handled.

Steam is supplied by two 300 hp. and one 500 hp. B. & W. Sterling H-Type boilers operating at 250 psi. with Cochrane-Hays controls. Fuel is bunker C oil. Boiler water is treated by Permutit equipment. Electric power is purchased.

Some idea of the enormous quantities of water needed to operate the condensers is gained from the equipment of the pump room. There are four 10-inch and four 12-inch delivery Ingersoll-Rand single stage centrifugal pumps.

To avoid disasters from electrical failures, half of each size of pumps are driven by Terry steam turbines which are automatically cut in in the case of power failures.

Heat and Water Economy

Water is, of course, reused where possible. The principal use is in the barometric condensers where 195,000 gallons per hour for each bank are needed when operating at capacity. This water goes to the respective hot wells from which it is pumped through the jackets of the concentrating columns. The spent water then is pumped to Fluor and Foster Wheeler cooling towers at 93-95 deg., cooled and recycled. In spite of the huge volume of water circulated throughout the plant, one 4-in. Gardner-Denver motor driven pump on the well supplies all the makeup needed.

For fire protection the entire plant, including the fruit bins, is sprinklered.

The personnel of Vacuum Foods Corporation includes: John M. Fox, President; H. R. Cloud, Vice President (Operations); H. C. Boerner, Sales Manager; D. Draper, Assistant Treasurer; W. R. Roy, Chief Chemist; Henry Cragg, Superintendent; and Frank E. Penn, Chief Engineer.

APAC, used as exterior siding on this 4000 ft. long aircraft assembly building, combines streamlined design with permanence. Designed by The Austin Company.

TIME ONLY TOUGHENS . . .

K & M "Century" APAC

● Yes, K&M "Century" APAC Asbestos-cement board can really take it . . . and it gets tougher as time passes. Completely fire-resistant, weather-proof and rot-proof, APAC was specified and used for these and many other reasons on the huge assembly plant shown above.

Made of asbestos and Portland Cement, APAC comes in 4′ x 8′ sheet sizes, 3/16″, 1/4″ and 3/8″ thick.

Though almost rock-like in hardness, APAC is easy to cut and fit on the job. Once in place, it lasts indefinitely, without maintenance or protective painting; its low first cost is last cost.

Write for details on how APAC serves industry in many valuable ways . . . as office panelling, inside sheathing, partitions, shower stalls, elevator casings, walls and sidings.

Nature made Asbestos
Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos

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ECONOMICAL
EFFICIENT
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PRODUCTION
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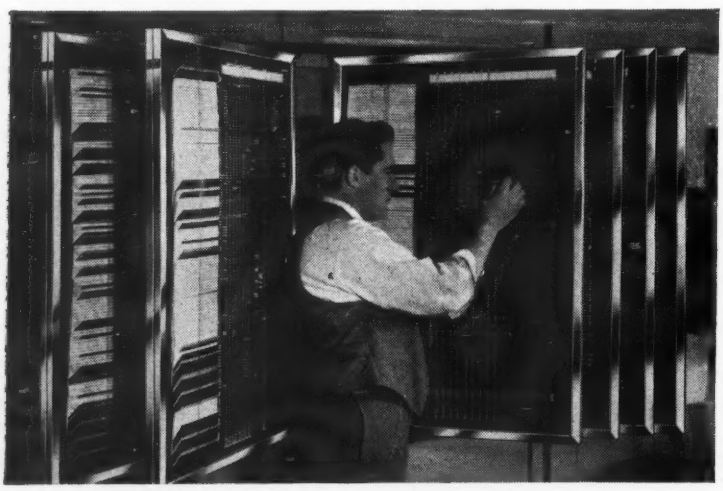


Produc-Trol
PICTURES FACTS FOR ACTION

National Research Corporation maintains a laboratory near the plant under the direction of Dr. Robert H. Cotton, who is responsible to A. Schroeder, Manager of Dehydration Research for N.R.C. Hugh Schwarz is head of N.R.C. process engineering and in charge of plant design. Since the process is licensed to Vacuum Foods Corporation by National Research, and there are still many pioneering problems to be solved, the latter maintains the branch laboratory in Plymouth to work on them as they arise.

I am happy to express my appreciation to the executives of Vacuum Foods Corporation and to Mr. Richard S. Morse, President of National Research Corporation, for their permission to describe the new operation, although I regret that the patent situation prevents telling all at this time. Further engineering data will be made available in the future.

—End—

Frankfurters

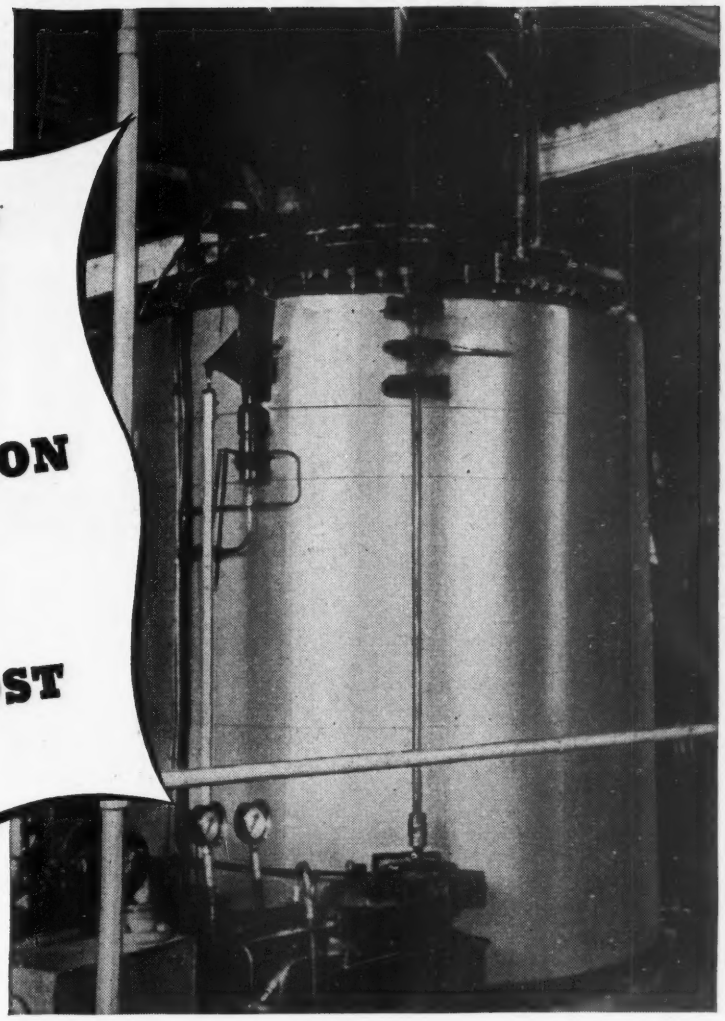
(*Continued from page* 95)

of 1,960 paid hours per week, including overtime, the average weekly labor cost at $0.60 per hour amounted to $1,176. Estimated yearly cost with 50 working weeks per year added up to $58,800. Gross yearly savings obtained with the new method, based on a 29 percent saving in production cost without increasing production, amounted to $17,100. If production were increased 41 percent as estimated, gross yearly savings would amount to $24,200, disregarding improved burden absorption or profit from increased production.

Approximate installation costs for a new system providing 30 work tables were $4,000 for equipment, material and labor; and $2,500 for consulting services including method, layout and design. Assuming three-year amortization, there would be a $2,133 depreciation cost per year and an estimated $750 power cost per year. Therefore, net yearly saving (not considering production increases) would be an estimated gross yearly saving of $17,000, less $2,900 for yearly charges, or $14,100.

The banding operation can be mechanized and production costs reduced by installing a Kartridge-Pak banding machine. The machine bands the frankfurters and connects them together with a perforated strip.

STAINLESS TO RESIST CORROSION CLAD TO REDUCE COST IN FOOD PROCESSING



The tank of this machine for freezing fruits and vegetables was fabricated by R. D. Cole Manufacturing Company, Newnan, Ga., of a Lukens Clad Steel. The machine operates with a special sugar solution or a solution of sodium chloride, 20% strength. Since these solutions come in contact with both the metal and the food products, it is essential that corrosion be eliminated.

WELL-KNOWN advantages of solid stainless steel for food processing equipment can be obtained, at substantial savings, with Lukens Stainless-Clad Steels. They are the result of over 17 years of experience in producing clad steels, with numerous applications in the food industry.

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Additional information on Lukens Stainless-Clad Steels is offered in the new Bulletin 338; on Lukens Nickel-Clad, Inconel-Clad and Monel-Clad Steels in Bulletin 255. Please write for copies. Lukens Steel Company, 401 Lukens Building, Coatesville, Pa.

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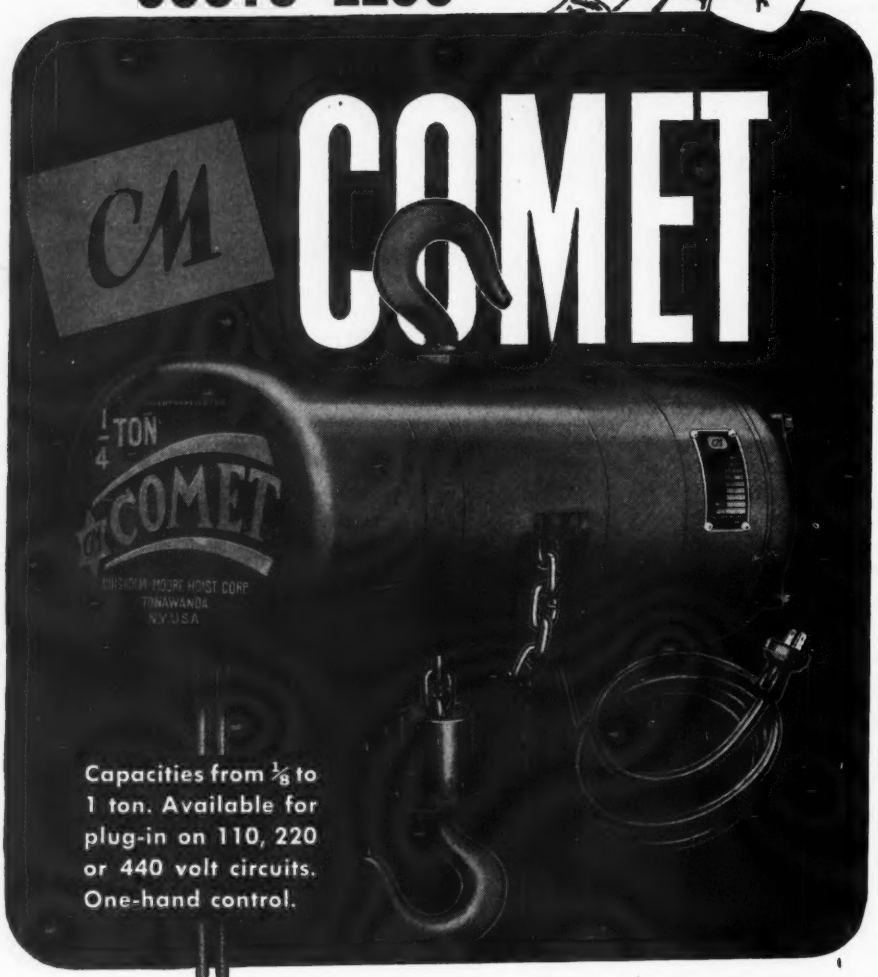

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Grading Pectins

(*Continued from page* 98)

tent is reduced to produce slow-setting pectins, the ratio is reduced to approximately one. Also, with high methoxyl pectins, the Tarr-Baker tester yields higher results than those given by the other instruments. This difference is also eliminated by reducing the methoxyl content of the pectin used. The explanation for these effects is beyond the scope of this paper and will be discussed elsewhere.

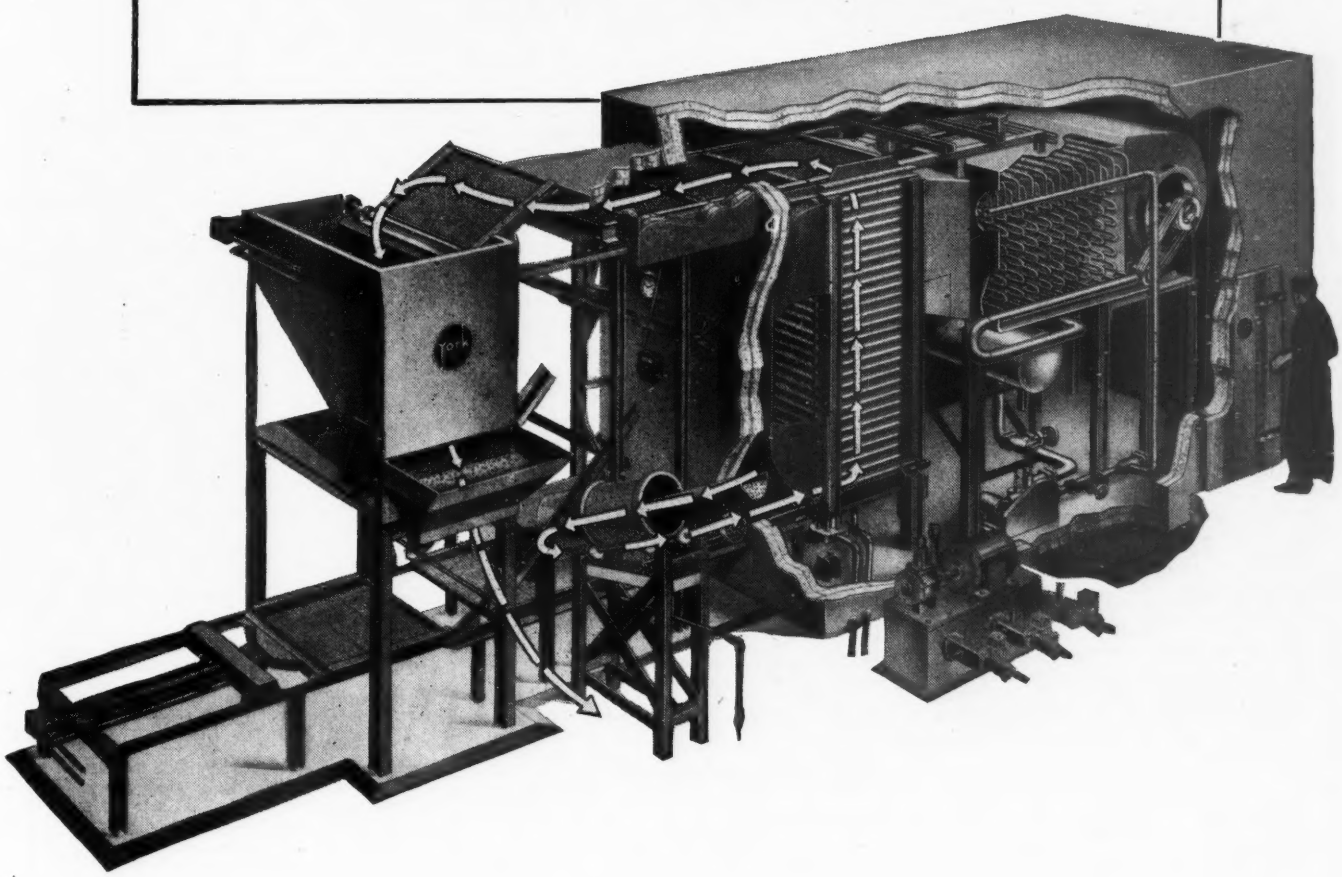
Inasmuch as spreadability and rigidity are the two important physical features of a pectin jelly, it seems that reducing the methoxyl content of the pectin will yield a more desirable product for jelly manufacture. The jelly manufacturer has found that slow-setting pectins are better for mechanical reasons, and it is fortunate that the gels produced with such pectins are superior.

Concerning the best method for grading pectin, a few observations may be made on the basis of the data presented. As Olsen and coworkers pointed out, the results with a synthetic fruit juice should approximate the results with a natural fruit juice more closely than a more acid medium. With slow-setting pectins, however, the differences are not so marked. Among the instruments used, the Tarr-Baker was more time consuming and less reproducible. Differences in ease of operation and reproducibility of the other two are slight. The rigidometer has the advantage that once calibrated, results are the same with all types of gels and they can be placed on an absolute basis.

Grading Pectin in Fruit Juice

The rigidometer can be used to determine the jelly units of pectin in a fruit juice. The jelly is made by using 250 ml. of juice instead of the synthetic mixture. A weighed amount of standardized pectin is added with the sugar, as before (adjusting for the solids in the fruit juice). The difference between percent of pectin required to give a standard jelly in the fruit juice and that for the synthetic medium is the percent of pectin of that grade in the juice. Thus, in the case of a boysenberry juice, it was found that 0.285 percent of a 180-grade pectin was required to give a standard jelly, while 0.361 percent was required for the synthetic medium. The difference, 0.076 per-

Here's *one answer* to rising food costs



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This sensational development is a logical triumph for York engineers whose equipment is today processing more than half of the nation's frozen foods.

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HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

Handling conditions vary for each particular plant. Your own problem should be presented to an experienced material handling engineer. However, the following example outlines a simple method for determining the savings possible with an electric industrial truck. Let us assume a hypothetical plant with the simple problem of transporting daily 180 tons of material 200 feet from stockrooms to processing machines. Without power trucks this would require 10 truckers, each making 10 round trips per hour, or 80 trips per day, carrying 450 lbs. of material per load.

COST OF MATERIAL HANDLING

Per ton—based on 180 tons per day

In addition to these savings, Baker Trucks reduce warehouse rental charges by tiering, contribute to plant safety, speed production and material movement, and perform many other operations that reduce plant overhead.

TABLE I—*Handling Costs Without Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (85¢ per hour)	$68.00	$0.378
Social Security Taxes	2.72	0.015
Workmen's Compensation	1.00	0.006
Hand Truck Depreciation	0.30	0.002
Total	$72.02	$0.401

In order to mechanize handling operations, the following equipment would be required:

TABLE II—*Cost of Equipment for Mechanizing*

Fork Lift Truck 2000-lb. capacity	$4,100.00
Battery	600.00
Charging Equipment	840.00
200 pallets	700.00
Total	$6,240.00

The truck, handling one-ton pallet loads of material, making 24 round trips per hour, could transport the 180 tons in 7½ hours.

TABLE III—*Annual Expense—Truck Operation*

Depreciation—Truck at 10%	$410.00
Battery at 20%	120.00
Charging equipment at 6⅔%	56.00
Pallets at 20%	140.00
Tires	100.00
Repair and Maintenance—Truck	164.00
Battery	24.00
Charging Equipment	33.60
Replacement of damaged pallets	70.00
Electricity	82.00
Insurance	10.00
Total annual expense	$1,209.60
Expense per day	4.03

TABLE IV—*Handling Costs—With Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (Driver—$1 per hour)	$8.00	$0.044
Social Security Taxes	0.32	0.002
Workmen's Compensation	0.16	0.001
Truck Expense	4.03	0.022
Total	$12.51	$0.069

TABLE V—*Savings With Electric Truck*

Savings Per Ton	$ 0.332
Savings Per Day (Handling 180 tons)	59.51
Savings Per Year (300 days)	17,853.00
Per Cent Reduction in handling costs	83%
Annual earnings on investment	286%

While this example is obviously oversimplified, Baker Material Handling Engineers are prepared to show you how similar savings can be made on handling operations in your plant.

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Baker INDUSTRIAL TRUCKS

cent, is the percentage of 180-grade pectin in the boysenberry juice.

Summary

The jelly grade of a number of pectins has been determined with three instruments and two media. Of the testers used, the rigidometer is the most rapid and precise, yields values for the modulus of rigidity or shear modulus, and requires only one calibration curve for all types of pectin gels. The sagometer which measures percentage sag of a gel is rapid and precise, and can be calibrated against the rigidometer to give values for the shear moduli. The Tarr-Baker tester, which measures breaking strength by force on a plunger, gives an indication of the brittleness of gels when used in conjunction with one of the other instruments. A shear modulus of 3 g./cm.^{2} was chosen as standard, and the results suggest that it be considered by the pectin industry as a basis for grading their commerical products.

References

1. Cox, R. E., and Higby, R. M., *Food Industries* 16 : 441, 1944.
2. Sheppard, S. E., Sweet, S. S., and Scott, J. W., Jr., *Industrial Engineering Chemistry*, 12 : 1007, 1920.
3. Campbell, L. E., *J. Society Chem. Ind.* 57 : 413, 1938.
4. Lampitt, L. H., and Money, R. W., *J. Society Chem. Ind.*, 56 : 290T, 1937; 58 : 29T, 1939.

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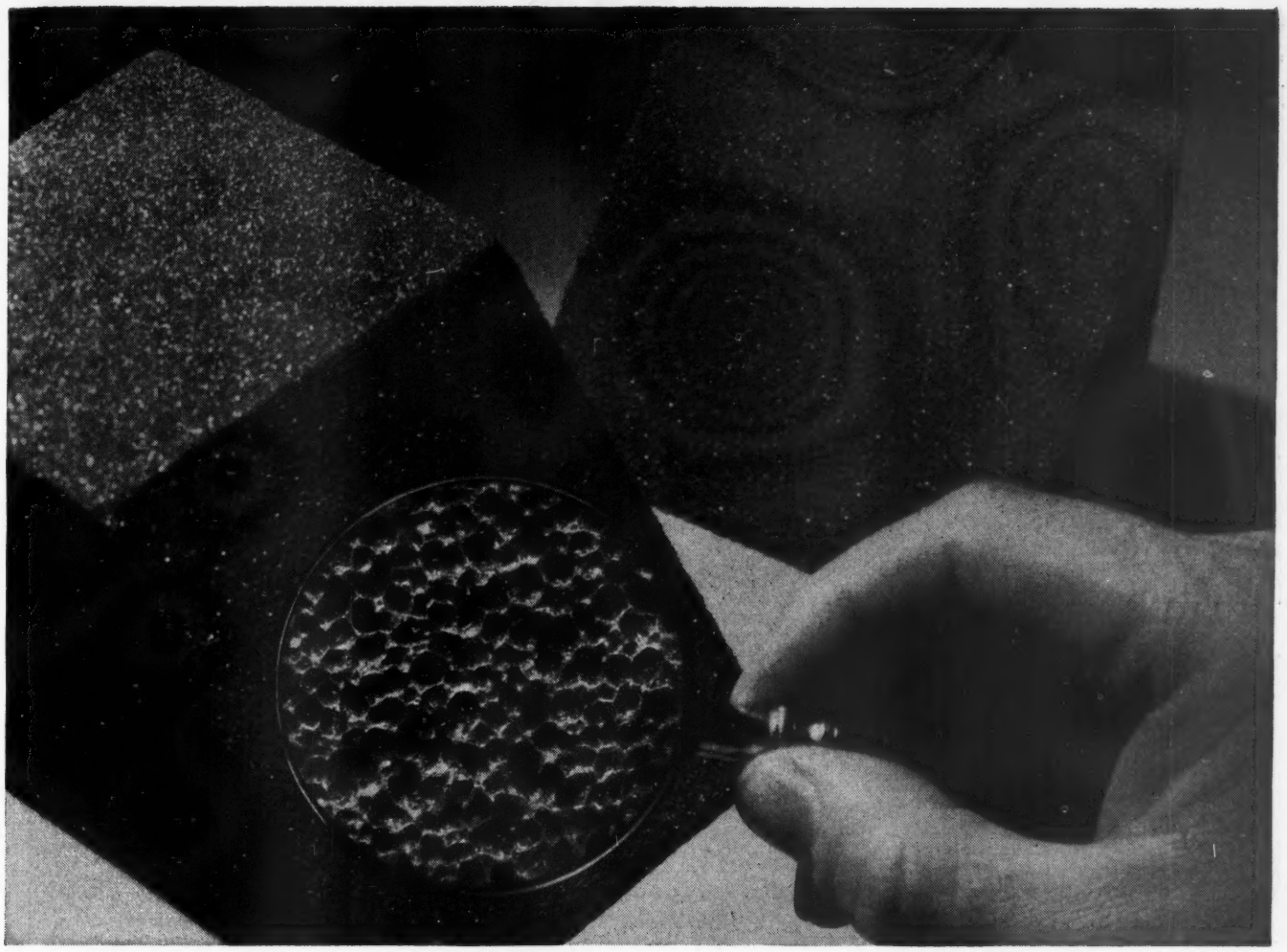

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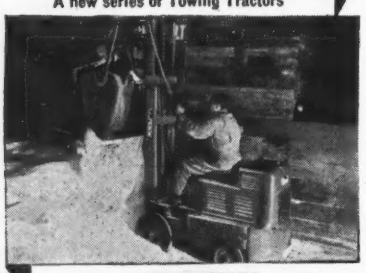

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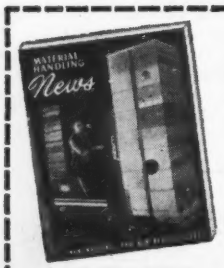

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5. Silverborn, S., Dissertation, Uppsala, 1945.
6. Tarr, L. W., Univ. Del. Agr. Exp. Sta. Bull. 142, 1926.
7. Owens, H. S., and Maclay, W. D., *J. Colloid Science* 1: 313, 1946.
8. Hinton, C. L., Fruit Pectin, 1st Am. Ed., Chemical Publishing Co. 1940.
9. Olsen, A. G., Stuewer, R. F., Fehlberg, E. R., and Beach, N. M., *Industrial Engineering Chemistry*, 31: 1015, 1939.
10. Mottern, H. H., and Karr, E. E., *Fruit Products Journal* 25: 292, 1946.

Frozen Food Industry Package

FOOD INDUSTRIES "Frozen Food Package," containing the following reference material on frozen food processing, distribution and marketing is now available and may be ordered from Food Industries, McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York 18, N. Y.

1—Food Industries' Reports on Frozen Foods. Charts by commodities and producing areas showing frozen food production of fruit, vegetable and fishery products since 1937 with a projection of production to 1948.

2—Frozen Food Report No. 2, Part I. Transportation, warehousing, frozen food distributional facilities, maps and tables.

3—Frozen Food Report No. 2, Part II. Frozen food marketing areas, map and tables.

4—Food Industries' Directory of Frozen Food Processors and Distributors. An alphabetical list of frozen food processors, showing location of offices and plants, company executives, commodities processed, type of freezing system, type and size of packages; cross indexed to facilitate locating packers of any type of product, and a geographical listing of frozen food distributors.

5—"So You Are Going Into Freezing?" What data should a processor have before entering into the production and distribution of frozen foods? Sound answers to a host of questions will be needed, therefore, a check list questionnaire is presented as a guide. It will aid manufacturers and distributors in evaluating problems and opportunities in the frozen food field.

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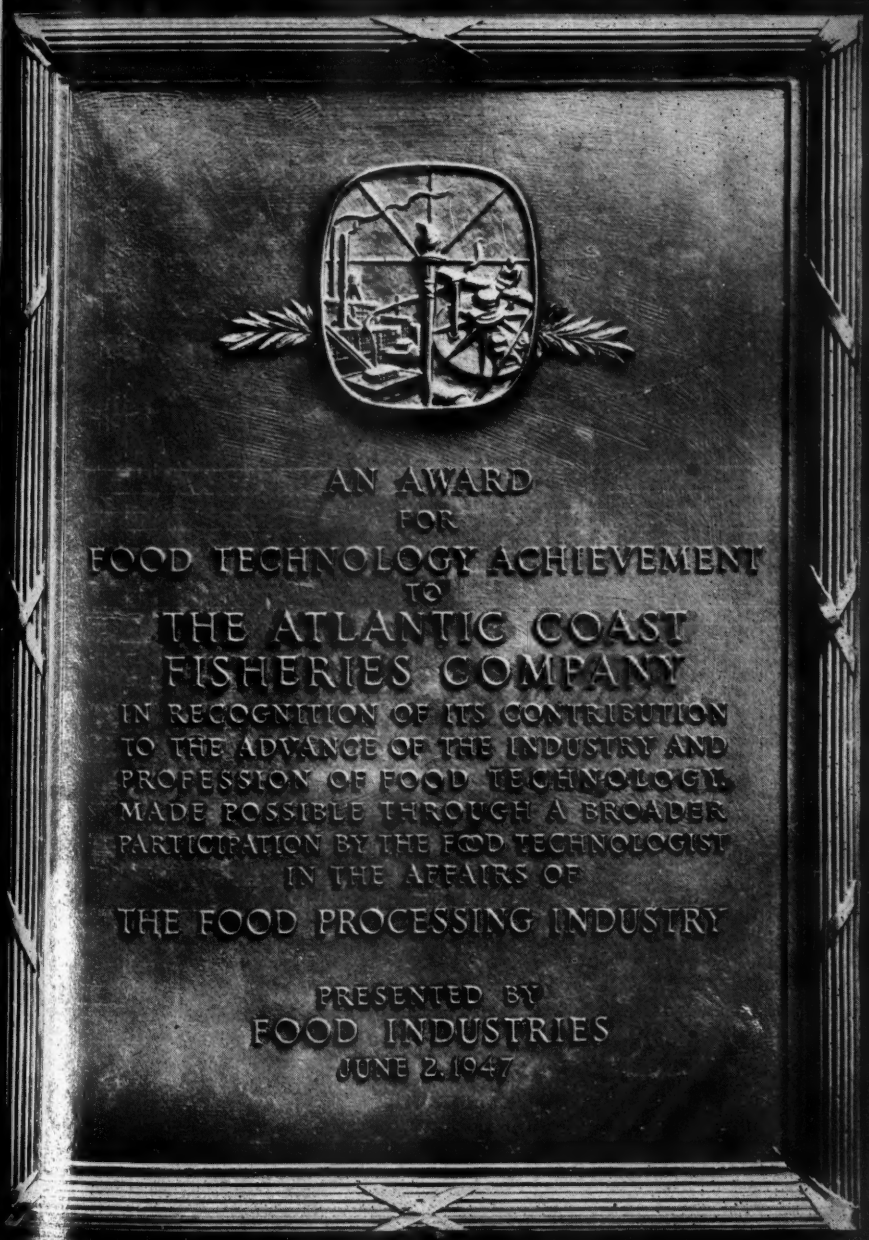

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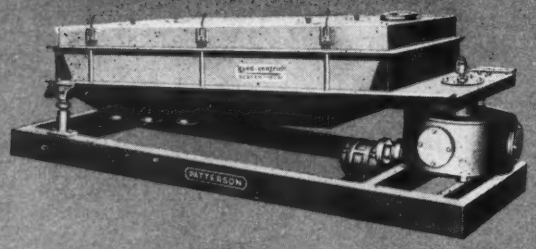

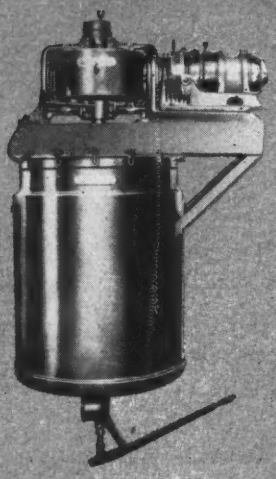

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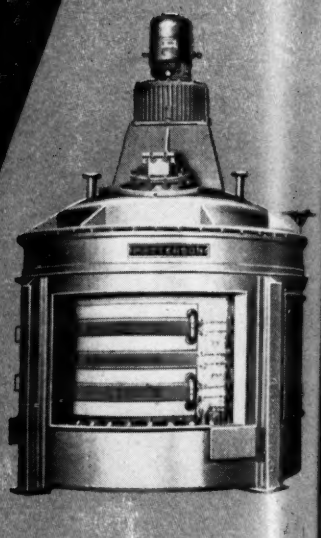

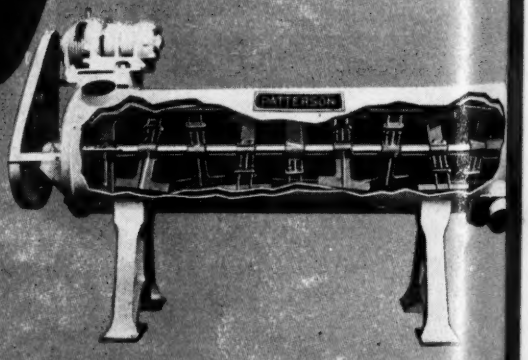

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JUNE, 1947 Volume 19, Number 6

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THE COVER

Food processing equipment is symbolized on the sculptured medallion of the Food Industries Achievement Award plaque. The Gorham Company's Bronze Division was commissioned to execute the plaque, 18 x 26 in., as soon as the award jury had made its decision. See story of the winning contribution, page 69.

FOOD INDUSTRIES is published monthly. Price 35c per copy. PUBLICATION OFFICE: 210 S. Desplaines St., Chicago 6, Ill. Entered as second-class matter at the Post Office at Chicago, Ill., under the act of March 3, 1879. Subscription rates: United States and possessions, $3.00 a year, $4.00 for two years, $5.00 for three years. Canada, $4.00 a year; $6.00 for two years; $8.00 for three years (payable in Canadian or U.S. Funds). Pan American countries $5.00 for one year, $8.00 for two years, $10.00 for three years. All other countries, $15.00 a year, $25.00 for two years, $30.00 for three years. Return postage guaranteed. Please indicate your position and company connection on all subscription orders. FOOD INDUSTRIES invites subscriptions only from the following: executives, engineers, technologists and operating supervisors in food processing companies, and from consultants and laboratories whose field includes food processing. McGRAW-HILL PUBLISHING CO., INC., James H. McGraw, Founder and Honorary Chairman. EDITORIAL AND EXECUTIVE OFFICES: 330 West 42nd St., New York 18, N. Y. BRANCH OFFICES: 738-9 Oliver Bldg., Pittsburgh 22; Aldwych House, Aldwych, London, W. C. 2; Washington 4. JAMES H. McGRAW, Jr., President; CURTIS W. McGRAW, Senior Vice-President and Treasurer; JOSEPH A. GERARDI, Secretary; NELSON BOND, Director of Advertising; EUGENE DUFFIELD, Editorial Assistant to the President and J. E. BLACKBURN, Jr., Vice-President (For Circulation Operations). CABLE ADDRESS: "McGraw-Hill, N. Y." Member A.B.P. Member A.B.C. Contents indexed monthly in Industrial Arts Index.

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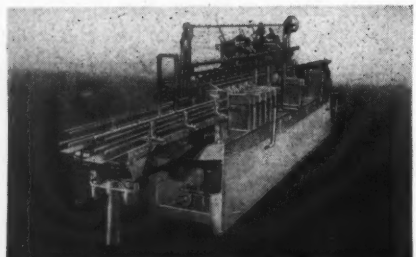

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All Must Help Reduce Prices

HEADLINE readers could easily have gained the notion that we Americans are trying to talk ourselves into a buyers' market, from the predictions from high places late in April. Added to the Washington predictions, however, is the inescapable fact that the second round of wage increases is now upon us.

Part of the continuing demand for higher wages stems from the rising cost of living, for which both farmers and the food processing industry must accept their share of the responsibility.

Part comes from the remarkable profit showings of three-fourths of the corporations of the country in 1946. Labor is still trying to beat the tax collector to the company cash box, or, failing that, is determined to sustain the inflated economy by the mistaken device of increasing worker purchasing power via the bigger pay check—but not by increased productivity. And how we need the production, right now!

The President's announced policy calls for price reductions, citing the food rise as 36 percent above the 1945 average at retail, up 53 percent at wholesale. "Prices must be brought down," he said on April 21. The Secretary of Agriculture spoke to the House Committee on Agriculture on the day following the President's call for price reductions, and proposed a long term plan of agricultural price supports. This would include a program for the distribution of future surplus foods by a revival of the food stamp plan and free school lunches. Coming close on the heels of the President's speech, it seemed inconsistent until it was realized that the Truman plan is a short term measure while the Anderson plan is a long time program.

1947 Compared to 1929

Back of the thinking of each are some important statistics. Physical production of agricultural commodities is now 32 percent larger than it was in 1929, the year of maximum production of most things prior to the Second World War. Total nonmilitary employment in the present year is 10 million greater than in 1929, a 22.7 percent increase. The physical volume of industrial production is 71 percent more than it was in 1929. Yet the population of the United States is now 18 million, or 8.2 percent, larger than it was in that peak year.

As President Truman seems to sum it up, food supply is up about 32 percent while domestic consumers have increased only 8.2 percent and nonfood production is up about 71 percent. This spells a higher standard of living that presumably can be retained more certainly if the people do not need to spend too large a portion of their earnings for food. It is understandable why the current level of prosperity and business activity should be maintained, if it is at all possible.

A further factor comes from the Secretary of the Treasury. He told the Senate Finance Committee that if the price drop comes about as a result of the President's "moral suasion," the national income will drop $8 billions and federal income tax receipts will drop $4 billions. For that reason he argues there should be no present cuts in income taxes. Yet such cuts would do much to increase consumer buying power.

The President wants price reductions. The Treasury and Agriculture, however, come up with words of caution about their effects. Yet it is apparent that if prices do not come down, industrial wages will probably go up, and thus the stage would be set for a third round of higher wage demands. Hence the desirability for corrective action on prices that affect the cost of living.

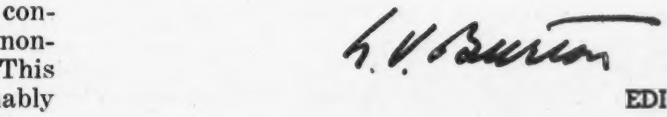
Many Must Take Less

On the basis of the Treasury estimate of $168 billions for the national income in 1947, at the 35 percent ratio of expenditure for food and beverages, the retail bill figures out at $59 billions. If the prewar ratio of food and beverage cost to total income were to be restored, it would mean that our food bill at retail would be roughly $50 billions. To reach that figure, it would take a $9 billions cut, or 15.2 percent.

Processors would never be expected to absorb a $9 billions cut in food prices. Only 8 years ago the total sales volume of the food processing industry amounted to $10 billions.

Many others—farmers, distributors and organized workers—must share with the processors the task of getting food down off the plateau of high prices to workable ratios. Higher productivity and greater efficiency are as essential as lower raw material costs to the success of corrective procedure.

No one should forget the fact that high level employment depends on what the workers have left after providing their families with food and shelter. This residual spending power determines national prosperity.



EDITOR

The Talk of the Industry

• CANNED sauerkraut prices turned soft earlier in the spring to the embarrassment of many an executive. It was a splendid example of what happens when everybody takes a notion to do the same thing at the same time. Since little sauerkraut is distributed in bulk any more, the custom is to pack it into cans as rapidly as the market will take it. The usual plan is to end up the summer with nearly every factory fermentation tank empty and ready to receive the fall crop. But, at the end of 1946, the primary processors individually and secretly decided that they would forestall an inventory loss by packing all their kraut into cans at least six months ahead of the normal time and sell it before the expected price decline could take place. When everybody did it at once, the anticipated decline became a reality. Prices dropped from about $1.30 to about $0.90 in short order, and distributors rebelled at taking in the goods ahead of time. Funny thing about it was that continuing consumer surveys (Nielsen and the like) showed that the public was eating sauerkraut in the normal manner and were not on a buyer's strike.

• CHEESE prices have been slowly easing down in recent months to the gratification of the manufacturers, believe it or not. On April 21 the prices on cheddars finally dropped back to the identical figure that held on the last day of OPA control in 1946. Big producers hope the price will go still lower so that curers will have more justification for buying large lots of young cheese for curing. Hand-to-mouth selling makes for an unstable market, and no curer in his right mind will load up on high priced cheese with the expectation of coming out even a year or two hence.

• THROUGHOUT the food processing industry there has been more talk about prices than about other current matters during the past month. Meat packers claim they are losing money on all fresh meat operations. Distributors claim ditto. Why, then do they have anything to do with fresh meats? Why do packers bid up the price of live animals only to sell at a loss? And why do chain stores buy dressed carcasses at prices so high that they also have to sell them at a loss?

In the case of each group the choice lies between the lesser of two evils. The meat packer has the choice of paying enough to get a sufficient number of animals to permit operating his plant, or else buying none and shutting down. Either policy at the present time is bound to result in financial losses, but it seems to be cheaper to operate killing departments in the red than shut down all killing and dressing. It should be remembered, however, that most packers can make money on other departments whether they remain in the dressed meat business or not. This is the explanation they give for buying $20 to $25 hogs—a figure roughly double the parity price.

When we query the distributor about his reasons for buying meat at prices too high to recover the overall cost from the consumer the story is much the same. If a store has a meat counter, such as a supermarket, and it is not supplied with all the cuts of meat the consumer wants, she is very apt to do her shopping at another place where she can get what she wants. For the larger retail outlets of today are one-stop affairs. So the farmer is the only current beneficiary of competition.

• ADMIRAL RICHARD E. BYRD, back from the Antarctic, suggests that the South Polar regions would be a perfect natural refrigerator for storage of surplus food crops in time of plenty. Congress should think well enough of the idea to explore it further and, if it seems practical, give it a trial. A few hundred thousand tons of cheap food stored in that perpetual refrigerator makes more sense than paying farmers not to produce it.

Hors d'Oeuvres

• Just after it happened the Farm Journal said, "With Henry Wallace out of the cabinet, he will not be seen or heard from too much over the next few weeks or months." Certainly F. J. did not intend to put such a heavy strain on the words "too much."

• *National Donut Week for* 1948 *has been changed from March* 29-*April* 3 *to March* 8 *to* 13. *Lose no time scrapping your old plans and arranging new ones.*

• The American Magazine reminds us that we planned to stop worrying about the wrinkles in prunes. By Pasteurizing under pressure they are said to stay young and full of vitamins. And you need not be skeptical just because Turkish baths didn't do the same thing for you.

• *Dr. W. Stuart McClellan recently told the American Bottlers of Carbonated Beverages that further research may prove soft drinks to be making a far more positive contribution to bodily health than they have been given credit for in the past. So, just switch the emphasis and keep on calling for scotch and soda.*

• The American Dairy Council has 40 percent of your ulcer problem solved. Cream in your coffee, they tell us, reduces by that much the caffeine induced flow of digestive juices, which contribute to the tendency to ulcers or aggravate an existing ulcer. Of course if you prefer your cream straight, that's o. k. with the A. D. C.

• *And Borden's modestly admit they can't guarantee that drinking milk will get you a contract at the Met—but, when John McCormack found his notes were not coming out right, he called for half a pint of milk. "His golden voice," they say, "then came forth with a creamy quality."*

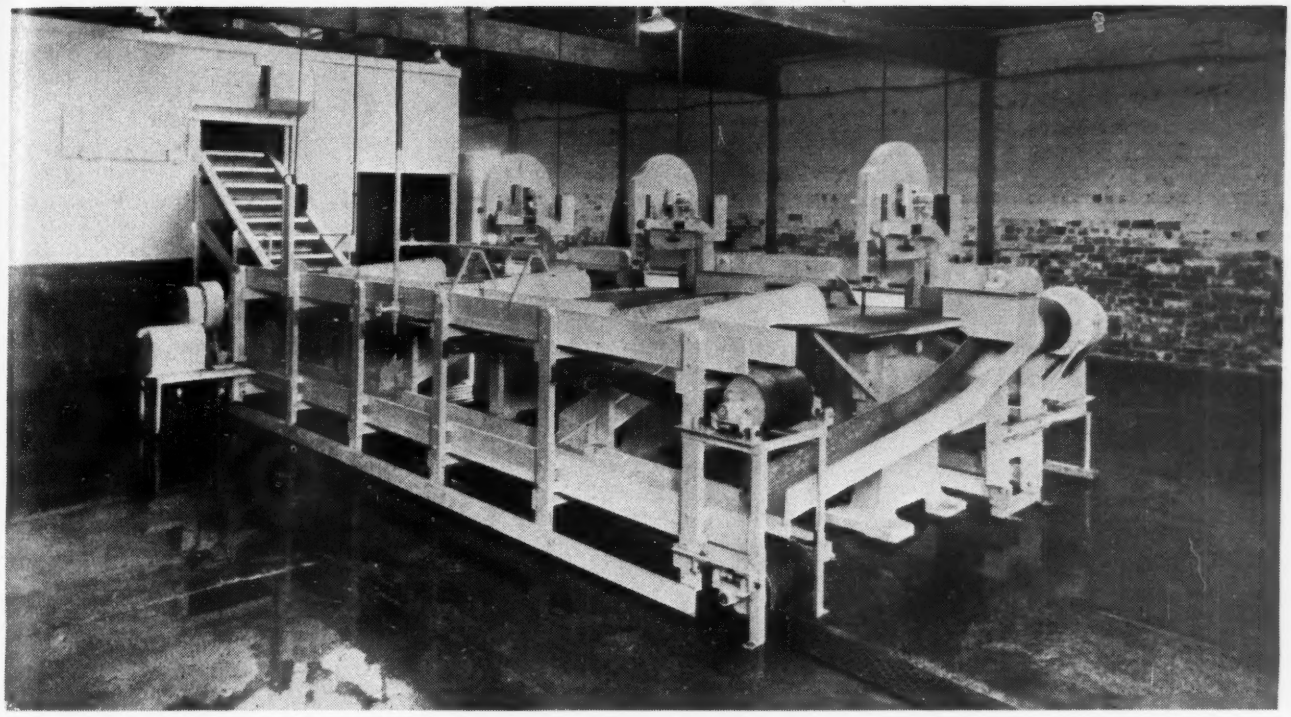
• In case you are wondering about those last two paragraphs, this is June Dairy Month.

• *Buyers Balk at Wine Prices From Champagne to Sherry, says a headline. Also from Portland to Portland.*

• The nation's food bill was about $36,200,000,000 in 1946, according to USDA. And if you were home often enough when the grocery boy arrived, you got the feeling that you paid the whole shot.

• *There were* 14,481,000 *horses on farms on Jan.* 1, 1940. *At the beginning of* 1946 *they were down to* 11,-455,000. *After last summer's meat shortage, could we have another count, please.*

J.A.J.J.



This is part of the "packaged" plant for continuous processing of cod and haddock, erected in Hull, England, by The Atlantic Coast Fisheries Company. Machines shown are heading saws. Fish are carried by conveyor. Heads fall down chutes onto lower belt. Automatic filleting machine is in specially enclosed room at rear. Delegations from all over Europe will visit this model plant.

Continuous Fish Filleter Wins F. I. Achievement Award

I. F. T. Jury singles out Atlantic Coast Fisheries Co. for its development of automatic fish filleting machines, key equipment units for the continuous processing of cod, haddock and related fish – in progress over 20 years

FOOD INDUSTRIES Editorial Staff Report

CONTINUOUS processing of fish, hitherto approached with salmon and sardines but not quite attained with cod and haddock, has become possible with the perfection of the universal, automatic fish filleting machine, which assures a regular and uninterrupted flow of fish through the fillet production line. For the development of the mechanical filleter, The Atlantic Coast Fisheries Company has been singled out by the jurors for the first Food Industries Achievement Award.

The development is of significance in three ways. It is a historic step in the growth of the industry. It represents an important advance in food technology. And it makes for an improvement in the quality and quantity of one of the important food resources.

In terms of commercial fishing, the automatic filleting machine is recognized as the contribution which marks the virtual completion of the transition of fishing from a trade into the present-day well-capitalized industry, something which has been going on for a century.

In terms of the technology of fish processing other than canning, the automatic cutting or filleting machines are the key element in plant mechanization, permitting the replacement of a great deal of handwork by a continuous and coordinated machine operation.

In terms of the interest of the consuming public, the automatic production of fillets offers a number of economies and advantages. The product is more uniform, costs less to make, and is under improved sanitary control by reason of the machine processing. The higher recovery of edible protein is important from the conservation aspect.

William Fellowes Morgan (left) is chairman of the board of The Atlantic Coast Fisheries Company. Edward H. Cooley (right) is president. Mr. Morgan was formerly New York City Commissioner of Markets. Mr. Cooley will spend several months in England handling negotiations for the use of filleting machines.

Twenty Year Struggle

In view of its obvious benefits, the perfection of a machine for automatically cutting fish fillets may be discounted by some as a routine and inevitable engineering accomplishment. The winner of the Achievement Award, however, can tell of a 20-year struggle with a problem which took a toll of personnel, cost a fortune, and was several times almost abandoned as hopeless, or without any practical solution.

Eventual success of the automatic filleting project has meant the turning of what was once feared a million dollar loss into a multimillion dollar potential profit. The final successful outcome is an excellent example of the kind of contribution the food technologist can make in a food processing operation.

The evolution of the filleting machine involved complete familiarity with the anatomy of the material to be worked on. An engineering approach was essential for devising a method of doing the work mechanically. The practicality of the whole undertaking, however, rested to a large extent on a foundation of economics. All of these qualities were effectively combined in the personnel of Atlantic Coast who brought the project through to a successful conclusion. This combination of talent—almost essential for a real contribution in the field of food technology — was undoubtedly in the minds of the award jury in their deliberations.

One of the stipulations an award winner must meet is the requirement that the process or invention be in commercial use for at least a year. Atlantic Coast met this requirement with regular operation of filleting machines at its Provincetown plant commencing in 1942, the year the engineering department turned the whiting equipment over to the operating department for regular use. This was followed by release of the cod and haddock machine to the Boston plant in 1943. Interest in the equipment has since become world wide, and has been especially active in the past six months. The company has in operation in England a model processing plant in which filleting and accessory machines have been installed. This unit is expected to be the first of many such in Europe.

Historic Significance

Mechanical filleting machines are sixth in a sequence of developments in the fishing industry of historic importance. It's less than 100 years since fishermen were manipulating nets from sailing vessels. Their catch was available in the fresh condition for only a short time. One of the first technological improvements was the use of ice on board, possibly known to the ancient Romans but used on an extensive scale only since 1850.

Real industrialization started with the use of steam and steel. Steam was as important on deck, for operating winches, as it was for propulsion. Steel's greatest contribution came with the introduction of wire rope.

Power winches and steel cables together made it possible to use larger nets and improved gear. It became practicable also to reach schools of fish at greater depths. Up to this point, a net for towing — as distinct from a net set out in shallow water—was made in the form of a bag with a wide mouth held open by a big spar or "beam," the beam trawl. The beam trawl, however, was made obsolete by the invention of the otter trawl in which the net is spread by otter boards or "doors" attached to the towing lines, one on each side of the net. Forward movement of the vessel causes the doors to diverge and thus to open the net. The doors move away from each other as a kite rises in the wind. Newest thinking of experts on gear, indeed, is that the net might be kept submerged by some form of hydroplane fins instead of being sunk by its own weight.

Frozen Fillets

These first historic developments improved the catching of the fish and their condition on landing. The later developments improved the complementary functions of processing and distribution. One phase was the development of mechanical refrigeration, followed after a long interval by the introduction of methods of quick freezing. Fast freezing was introduced originally for the preservation of fish fillets. As it gained acceptance, the frozen fillet helped to popularize the fresh or iced fillet. As long as it remained a hand operation, however, the filleting step was the costliest and messiest part of the whole procedure. It was the recognition of this situation which prompted inventors to tackle the problem of doing the filleting mechanically. As it turned out, eventual success in devising such a machine lay much farther ahead than was thought by the pioneers. The need was evident, however, and those who met it supplied the element of greatest importance for continuous and mechanized processing of cod and haddock and similar fish.

In any scheme for mechanizing the handling of fish in the processing plant, the automatic filleting machine is both prime mover and governor. How the machine sets the pace for a continuous and coordinated operation can best be appreciated from a description of operations as done in this country and as arranged in the model "packaged" plant sent to England. The operations of scaling, grading, filleting, brining and packaging are tied in together, with a minimum of hand labor required for each of the steps. There is never more than three minutes' supply of fish in advance of the heading machines. Once the fish is headed, the material does not come to rest again until the wrapped fillets have been cartoned.

Handles Various Sizes

Uninterrupted operation on fish of various sizes is one of the features of the filleting machines. The cod and haddock machine was described in the October, 1946 issue of Food Industries. It will fillet fish of from ¾ lb. to 10 lb. There are only three size adjustments on the unit. The equipment has to be set for fish weighing from ¾ lb. to 2 lb., 2 lb. to 5 lb., and 5 lb. to 10 lb. The setting is predetermined in accordance with the size of the fish in the catch being processed.

Operating speed on cod and haddock is 45 fish or 90 fillets a minute. The other units in the processing line are geared to this pace. Output of a given plant can thus be scheduled closely. In carefully controlled test runs, completed some time ago, it was found possible to predetermine output by the standard machine rate. Mechanical trouble cost less than 2 percent of potential output. The real problem in continuing at the pre-set machine rate was to maintain fish in constant supply to keep up with the mechanical cutting. Furthermore, as is not possible with hand filleting, the machine can handle a glut of fish by a schedule of extended hours.

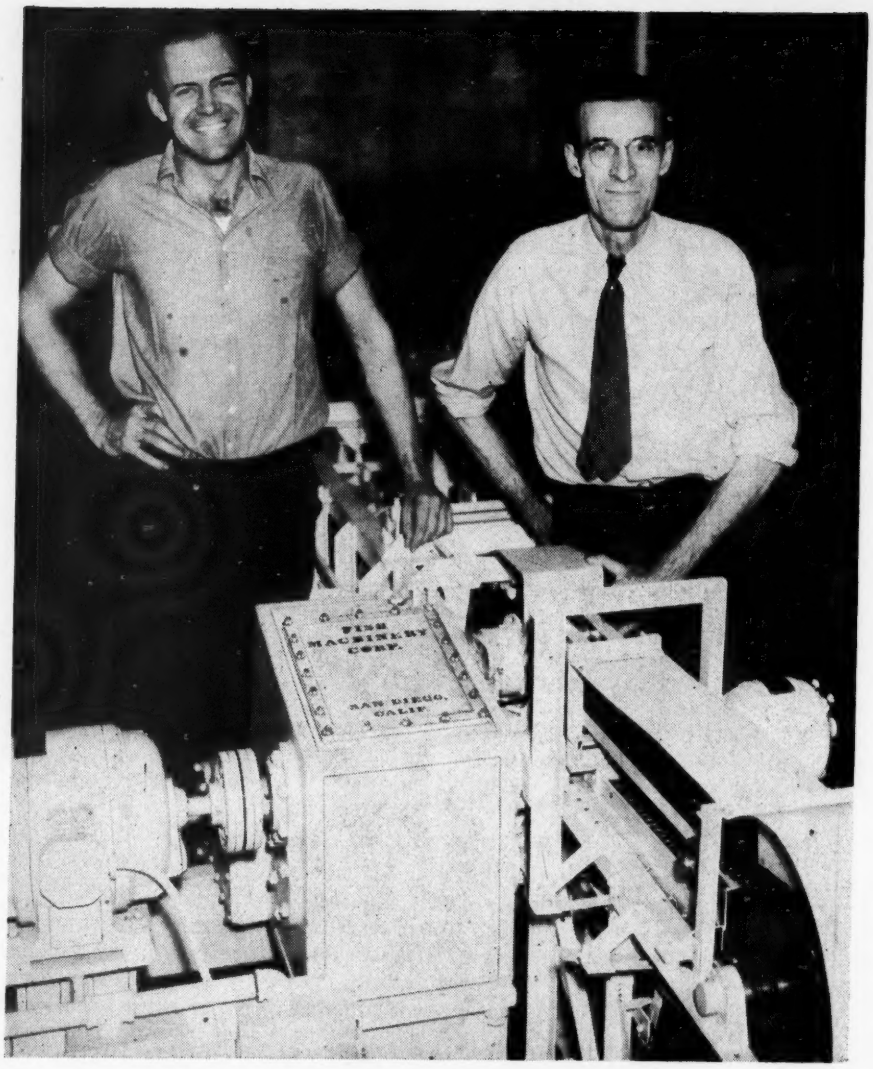
It should be emphasized that there are still a number of steps where hand labor is needed, even though the procedure is on a continuous basis. Machine filleting will, however, soon be complemented by the introduction of mechanical devices for most of these other operations.

Further Mechanization

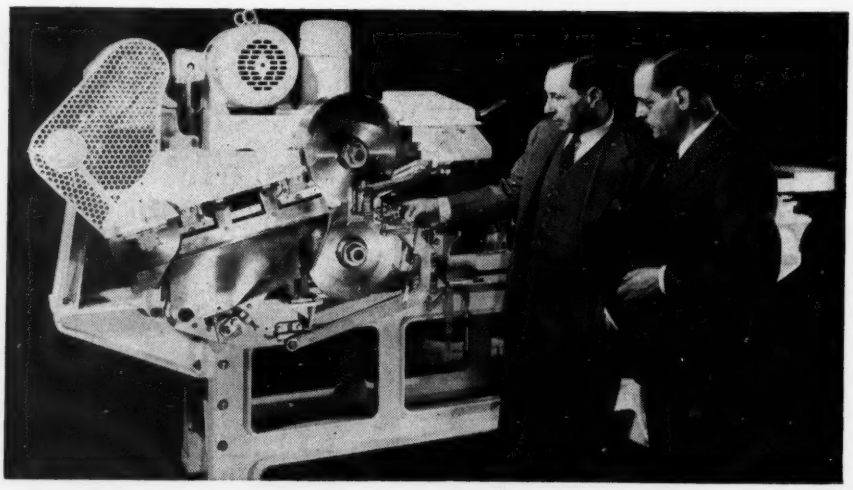
Further mechanization can be expected to start at the delivery end of the line and to work back to the preliminary processing. Wrapping and labeling machines are already available, there being no special problem in applying standard models for working with fillets already in the package. It is still necessary to hand-fill cartons on the package line, however.

Definitely in development is an automatic header for cod and haddock, which will be synchronized with the filleter so that the one machine feeds into the other. The principles here have been established. It remains to combine them in a standard trouble-free unit. A more remote objective is a mechanical device for bulk scaling such fish as haddock and pollock.

What mechanical developments are emphasized in the future will depend to some extent on the species of fish to be handled. In the case of



Shown with the original cod and haddock filleting machines are William H. Hunt (right), inventor, who with his son Douglas (left) worked ten years on this pioneer model. Machine was sold to The Atlantic Coast Fisheries Company in 1939. Cod and haddock machines were afterwards greatly modified. This unit, now of historic interest, was used for experimental work on whiting and redfish machines.



This is one of 26 redfish filleting machines now being manufactured by American Machine and Foundry Co. W. A. Ellison, Jr. (right), is manager of the machine and engineering division of The Atlantic Coast Fisheries Company. Charles M. Savrda (left), chief engineer, points to detail which delayed redfish machine four years. This unit is equipped with brackets and pedestals for accessory units so that the machine can be converted for universal operation.

cod, the fish is usually skinned, rather than scaled. A mechanical skinning machine is thus indicated, and there are several in various stages of evolution. With haddock, skinning is not common, and thus a mechanical scaler is of greater interest. It is probable, however, that haddock may have to be skinned also as the customer becomes more discriminating.

In the case of whiting and redfish the degree of mechanization, thanks again to the filleter, is higher than has been worked out for the cod family. The redfish machines now made for commercial use are capable of operating at 75 fish or 150 fillets a minute. No adjustment for size change is needed. The preliminary heading is mechanical. Feeding is direct into the filleter, although still by hand. The pilot redfish machine has been used as an experimental unit for work with other species of fish. Standard models are now built so as to take the fittings and attachments needed for handling other species of small fish, making this equipment almost universal.

Universal Equipment

The redfish, whiting and the cod-haddock machines can handle between them about 90 percent of all fish now being commercially filleted. The species for which automatic equipment has not yet been devised include the flat fish. Other species which can probably be handled on the universal machine, however, include pollock, pike, croakers and mullets.

Atlantic Coast's whiting filleting plant at Provincetown is generally recognized as one of the most highly mechanized fish processing plants in the East. The sequence of operations here is as follows: Fish are headed on automatic heading machines. Then they are scaled in bulk in a rotary scaler. A conveyor carries the scaled fish to the filleting machines. Fillets are taken off on a belt and carried to the inspection table for any necessary hand dressing. About ten percent of the fish may require minor hand trimming.

Following inspection, fillets are conveyed to the brine tank for automatic brining. Brined fillets are collected in a weighing bin, then placed by hand in tin boxes for the packers. Fillets are placed in 10 lb. layer-packed boxes for freezing or 1 lb. cellophane wrapped packages for freezing.

Atlantic Coast is already well along with the development of a machine which will eliminate most of the hand work at the packaging table. This machine will be hand fed, but will do the actual packaging automatically. The entire processing line will then be tied in with the 200-a-minute output of the automatically cut whiting fillets.

Other officers of The Atlantic Coast Fisheries Company, winner of the first Food Industries Achievement Award, are (left) Lawrence T. Hopkinson, vice president, and (right) Walter Engel, treasurer. Head office is now in Boston.

Saves Material

One of the most remarkable features of the automatic filleter is that, unlike most machine work, it actually saves material. The recovery of edible flesh is from 10 to 18 percent higher than when fillets are cut by hand. Machine cut fillets also are more attractive in appearance, as well as being produced under conditions which facilitate sanitary control. The savings have a double significance. There is an obvious economy factor, which will probably be shared by the processor, his factory personnel, and his plant's customers. The potentially higher recovery of edible material, however, is significant from the standpoint of conservation of fishery resources, and thus important to both the industry and the general public. Machine filleting adds to the available food supply, especially in those countries where the sea is an important source of protein.

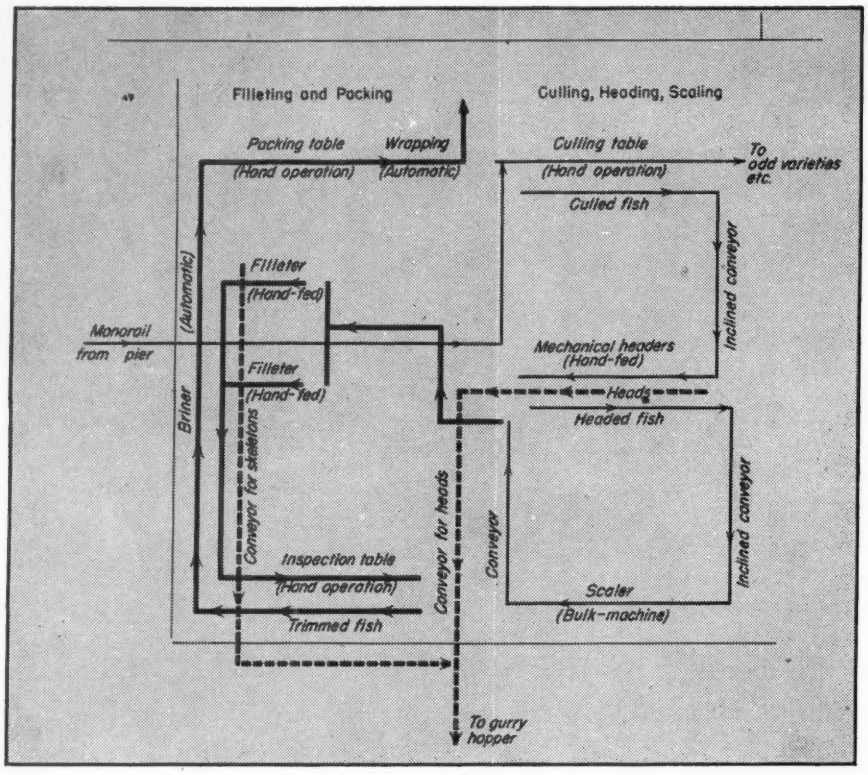
How the filleting machines can contribute to the general economy is illustrated by the potential effect on the British fishing industry. Landings of round cod at Hull and Grimsby were 506,000,000 lb. in 1934. For today's market, 60 percent of this would be filleted, or 303,000,000 lb. With the machine's recovery of 48 percent as edible fillets, the monetary savings on 3 c. fish at these two ports would be $1,130,000 a year in material only. No allowance is made here for labor economy.

In the United States, machine cut fillets were placed on the market without any effort to exploit the advantages for the consumer. It is certain, however, that the greater uniformity of the product and the improved sanitary control will be played up by distributors in their future marketing plans.

Many Vicisssitudes

When machine cut fillets are standard in the fish markets of the world, the vicissitudes of the inventors and promoters of the filleting equipment will undoubtedly be forgotten. As is usually the case with a mechanical development, however, there were innumerable disappointments and heart breaks, offset by flashes of inspiration on the mechanical problems, or the successful execution of strategy for keeping the project going when it was seemingly hopeless.

Atlantic Coast first became interested in the present type of filleting machine when Harden F. Taylor was president. He, with C. L. Guyman, vice-president, was responsible for the acquisition of the Hunt filleting machine which both decided had the elements essential in a successful device. Immediate responsibility for the development was first carried by Mr. Guyman. The individual closest to the project, however, and largely responsible for the eventual successful outcome was W. A. Ellison, Jr., now manager of the machine and engineering division of the company. It was he who had the detailed responsibility of coordinating the efforts of the inventors, Hunt and Savrda, of the company's engineers, and of the



Simplified flow diagram of the whiting filleting operations in The Atlantic Coast Fisheries Co.'s plant at Provincetown, Mass. This plant is regarded as one of the most highly mechanized in the East. Processing operations are continuous from boat to cold storage. Fish go through at the rate of 100 per minute.

machine shops where some of the mechanical work was done. In addition, the mechanical development had to be tied in with the general economics of the industry, with the technology of fish processing as it then existed, and with the natural limitations presented by the peculiar anatomy of the fish.

Guided by Skeleton

In comparison with wood and metal working, or package wrapping, there is nothing standard about the fish as a "work piece." It varies in size and shape and is slippery. Texture varies, depending on what has happened to the fish on board the trawlers. One side may be softened, the other firm. The basic conception which enabled the machine to allow for all these factors was to guide the fish by the skeleton through the various stages of cutting. Sending it through tail first also simplified the problem. These conceptions were the contribution of Hunt. The machine operation, also, simulates hand cutting in one important respect. When using a knife, the filleter can feel his way along the ribs of the fish. In the filleting machine, a pair of "floating" knives behaves in much the same way. In the case of the machines, however, stepwise operation enables the successive cuts to be made with much greater precision than is possible for even the most skilled filleter working freehand.

One of the early difficulties was to get standard performance on the quality of fish available in New York where the experimental work was being done. For one thing, it was not possible to run through large enough quantities to stabilize the operation or to analyze defects which might develop in heavy runs. Furthermore, the material was not the same as was being landed from the traps and the trawlers. The development work was accordingly moved to New England where run-of-the-catch material was available. On one occasion when the big haddock machine had been moved, the staff was temporarily at a loss when the machine failed to function, although it had been in perfect order when loaded. Investigation revealed the frame out of line. It subsequently developed that the truck carrying the equipment had overturned, straining the frame of the filleter.

Demonstration Goes Wrong

On another occasion, circumstances necessitated a full dress demonstration, which was arranged and carefully rehearsed. At the crucial moment, however, one side of the machine went out of order, leaving half the fillets incompletely trimmed. The breakdown was covered up by hand trimming the fillets as they went by on the machine, so that, when finally discharged, they were perfect, all of which was done without causing question in the minds of those making the inspection.

Once the project was nearly jettisoned. All expense was stopped and all personnel removed when — as it proved later — the machine was within an inch of attainment of the goal of a rugged dependable automatic mechanism.

How the final "bug" was taken out is a story in itself. The fish for the final cutting operation are moved along by "pusher fingers," attached to blocks on a roller chain. This mechanism would not stand the gaff of sustained operation. The defect was cured by redesign of this unit. This was the last major change found necessary in the long task of developing the cod and haddock machine. This last finishing touch was applied by Charles M. Savrda, coinventor and designer of the machines.

Present state of perfection of the filleting machines may well serve as a stimulus to those in other industries faced with involved mechanical developments. If the device is correct in principle, then it can be assumed that time, talent and treasure will eventually achieve the objective. It may take more of each of these essentials before the objective is fully attained. Whether it is worth attaining will depend on the economics of the situation, on the special field of the sponsor, and on the general state of the art and of the industry. The greater the vicissitudes, however, the less the risk of duplication or of imitation.

"Packaged" Plant in Europe

How far the mechanized processing has gone beyond the introductory stage is shown by the way Atlantic Coast went about setting up their demonstration headquarters in Europe. The Hull Ice Company in England made a building available and sent over floor plans of the structure. A complete processing plant was designed, shipped in assembled units and installed, ready for full scale operations. This "packaged" plant was complete to the last detail, even including lag bolts for attaching the machinery to the floors, as well as special generators for 60-cycle power on which the machine motors operate.

The model plant in England will

be looked over by representatives of the following countries, in addition to the English sponsors: Denmark, Sweden, The Netherlands, Norway, Iceland, France, Belgium, Spain and Portugal. Negotiations are most active with the groups in Norway, Iceland and England. Mr. Edward H. Cooley, president of Atlantic Coast, intends to take charge of the negotiations in England personally, after the machine has been demonstrated. His alternate is Wm. A. Ellison, Jr., manager of the filleting machine project, who will be assisted by Charles M. Savrda, the company's chief engineer, and a force of technicians from the domestic staff of the organization.

Attitude of Labor

An interesting aspect of the mechanized filleting development will undoubtedly come up wherever the machines are installed. It remains to be seen how the labor organizations respond to what seems inevitable progress. On previous occasions, mechanical aids have often been opposed by plant workers or by trawler crews. Atlantic Coast seems to have worked out an acceptable program thus far, one of its points being the payment of skilled filleters' rates to all working on the machines. In this respect, however, the fishing industry stands in little different position from other industries where mechanization and continuous processing seem inescapable, with the benefits logically to be shared by the sponsor, the production personnel and the consumer, with the improvement operating to the advantage of all.

Outstanding Contribution to Food Processing—Boon to the Industry

Two Washington officials, recognized authorities on the fishing industry, appraise the new machines

FOOD INDUSTRIES asked nationally prominent fish industry experts to write brief comments on the automatic filleting machines and to express their opinions on the significance of the machines. Two of these statements are reproduced below. They were made by A. W. Anderson, Chief of the Division of Commercial Fisheries, Fish and Wildlife Service, Department of the Interior, and Lewis Radcliffe, former Deputy Commissioner of Fisheries, now Director of the Oyster Institute of North America.

A. W. Anderson:

The biennial award of the Institute of Food Technologists is well-deserved recognition of the Hunt filleting machines, developed by The Atlantic Coast Fisheries Company, Inc. of Boston, as a most outstanding contribution to food processing.

These machines take the fresh and frozen fishery industries a long step toward the almost completely mechanized cleaning and packing operations which characterize some of our canned fish processes. The salmon industry is probably the best example with its "iron chink" and mechanical filling and weighing devices, and, to a lesser degree, the California sardine and mackerel industries with their mechanical cutting and cleaning machines.

If the domestic industry couples filleting machines with new types of skinning equipment — able to skin fillets and, if desirable, slice them to uniform thickness for improved packaging, better quality, and more uniform cooking—and with modern packaging machinery, it should be able to market a consumer package able to cope successfully with either imported fishery products or domestic foods of a competitive nature.

Provided the substantial extra yield of fillets is maintained under all commercial conditions this feature alone is a worthy contribution to conservation of our fishery resources, representing added volume of processed product for equal fishing effort. Increased sanitation in processing and improved quality are further expected dividends.

Since successful shore operation of the machines has been demonstrated in Massachusetts two interesting questions remain. First, are these machines a long sought answer to processing on large trawlers and factory ships? Second, can they be utilized, from an economic standpoint, in the seasonal fisheries of countries with normally large labor supplies, or of those whose shore labor may consist largely of the wives and children of fishermen?

Lewis Radcliffe:

The early colonists were attracted to our shores by the abundance of fish, without which many would have perished. For many years the fisheries constituted the backbone of New England's prosperity. They have always been highly individualistic in character. Our coastline—Atlantic, Gulf, Pacific and the Great Lakes—is dotted with small fishing hamlets—often fishing being combined with farming. These conditions have not been conducive to a high degree of industrialization, and those engaged have been slow to adopt lavor-saving devices. Fishing is one of the most hazardous of occupations. The handling of the product at the shore plants is unattractive to labor generally. As special skills are required in certain phases of the work, it has been difficult to obtain and retain productive labor.

Considering the many improvements in packaging and merchandising ready-to-serve food products, it is not surprising that Mrs. Homemaker does not look with favor on fish in the round. The advent of filleting of fish a quarter of a century ago represented a great advance in meeting the requirements of the housewife as evidenced by the fact that the annual production of fish fillets exceeds 200 million pounds. This change in production practice increased plant labor needs and simplified the problems of the retailer. But the filleting of 600 million pounds of fish in the round by hand labor is time-consuming, wasteful, not conducive to uniformity of the product and involves closer attention to matters of sanitation. The fillet cutting machines of The Atlantic Coast Fisheries Company, recently perfected at a cost of millions of dollars and 23 years of research, give promise of proving a boon to the fishing industry in solving the labor problem and providing a more uniform product. According to the president of the company, one of these automatic filleting machines will increase the yield per fish from 15 to 18 percent, save labor, improve the appearance of the product and make for better sanitation. If these claims are fulfilled, these machines should prove to be of great benefit to the fishing industry.

Explosive Dissociation For Processing of Cereals

Results with small unit indicate that explosive release of compressed air in grain may give anything from hull removal to flour production in continuous operation. Could be an important development in milling

A NEW process for exploding cereal grains and legumes by means of compressed air or other gases has been announced by the Midwest Research Institute of Kansas City, Missouri. The procedure has obtained a preferential segregation of husks, bran, germ and endosperm in wheat, grain sorghums and oats.

The Institute terms the procedure "explosive dissociation." Experiments indicate that the process offers possibilities of improved milling processes due to the easy separation of the component parts of cereal grains.

A laboratory unit has been built and tests have been conducted for many months. The principle utilized is that grain, under pressure, when fed through a nozzle within a pipe, is shattered by the instantaneous release of pressure within the pockets of the grain. While the apparatus compares in some respects with that used to obtain the flash pulverization of coal, the action on the grain is drastically different.

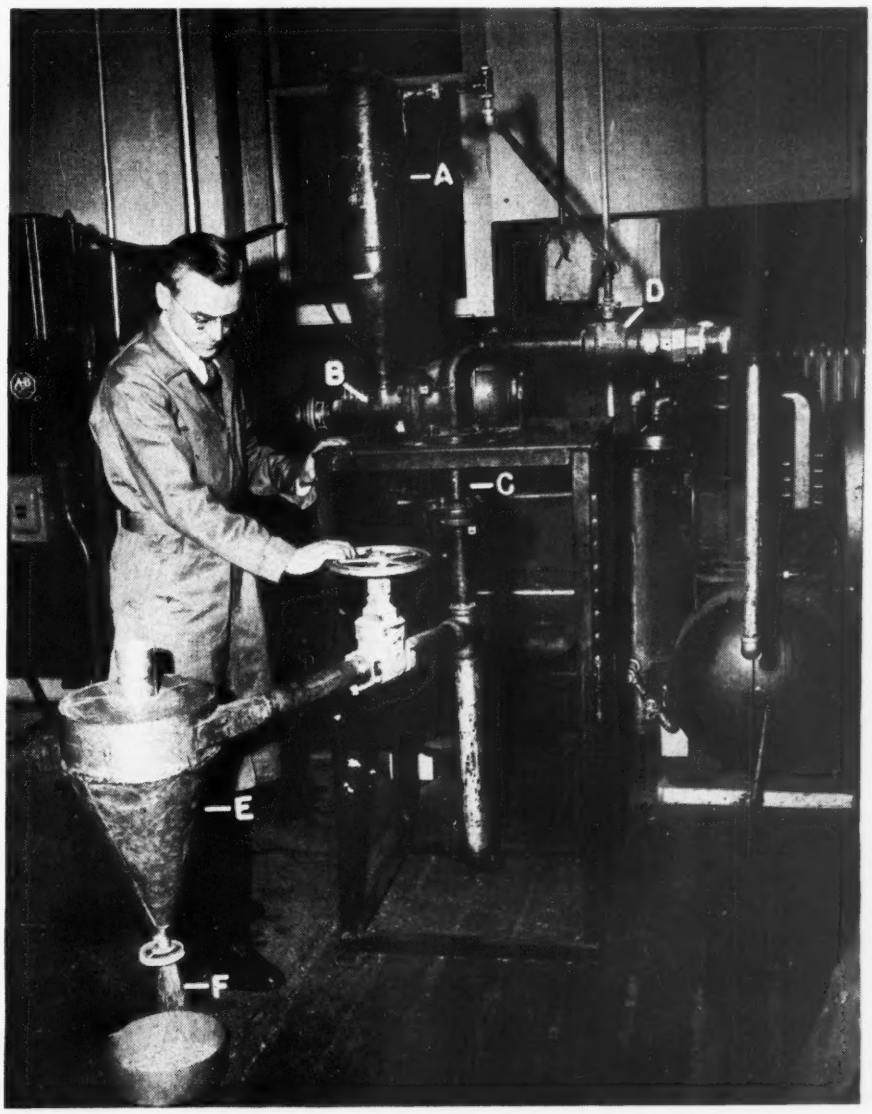
Controlling the Results

In the explosive dissociation process, by varying pressures and pressure contact periods, almost any desired end point can be obtained. With low pressure and short contact period, oat hulls are removed completely without harm to the oat berry. With a somewhat higher pressure, the oat is split and the germ removed. With still higher pressures, oats, or any grains, can be pulverized.

Coal, being homogeneous, is pulverized by the flash process. Cereal grains are composed of different structural parts and being non-homogeneous, can be dissociated or any part pulverized at will, depending on the control.

Patent rights have been applied for in the name of the regional industrial research organization. Plans are under way for the construction of a $100,000 pilot plant at the Institute in cooperation with cereal processors to test the procedure on a commercial scale. The plant will be a continuous process one, with a series of explosive dis-

(*Continued on page* 198)



Laboratory model of rollerless grain mill has been undergoing tests for many months. Shown here are: A, continuous-feed pressurizing cereal grain hopper; B, grain feed to high pressure air stream; C, housing containing nozzle where grain dissociation takes place; D, high pressure air supply line to pressure hopper and nozzle stream; E, separator removing grain particles from air stream; F, dissociated grain particles ready for segregation into husk, bran, germ, or flour as desired.

Locker Plant Operators Have Many Troubles

Designs not always right. Patrons can't always afford the best packages. Technical assistance is seldom handy. But locker plants are becoming food processing plants, often learning the art the hard way

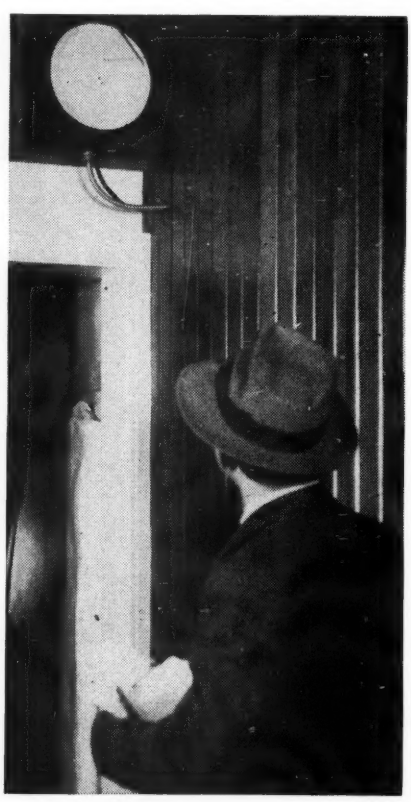
By NITA ORR, Bristol, Virginia-Tennessee

DESPITE the fact that locker plants have sprouted almost as if seeds had been sown broadcast, many problems of the plant itself and of its operation need to be solved. Any person who has an interest in the locker plant development and is familiar with the present situation is aware of the need. One authority stated that the big fault with locker plants is the people who build them. This the contractors deny vehemently. They have their argument, which can usually be summed up as: (1) they do their best with the money the operator has to spend; (2) they have no authority—merely build what the operator wants.

The trouble may actually lie, of course, in the fact that the operator does not know why he wants what he wants, nor why he should not want some of the things he wants. His plans for a locker plant are sometimes comparable to a young bride's plans for a house — lovely to look at, but often lacking in livable, workable features. And, just like the bride, the locker operator usually wants to make some changes after having occupied the building for a few months. The contractor replies that if he insists too much on building the plant as he thinks it should be, contrary to the ideas of his prospect, he risks losing the prospect to a less conscientious contractor who will, with pleasure, give the operator what he thinks he wants. It has happened before.

Design Problems

Some of the people who have built locker plants in the past have been slow to realize the excellent help on design they can have for the asking from some of the land grant colleges. And, in the efficiency of running a locker plant, even the placing of one door can be of extreme importance. The person who brings food to the plant to be processed usually has some business in the office. Plants can be built so that from the receiving door there is convenient access to the office, but some of them are not. Plants can be built so that the processing room is a separate workshop—away from people who are not directly responsible for getting the work done—but some of them are not. This could go on and on. Once the operation of a plant gets underway, oftentimes everybody connected with it is too busy to do much else than take each day as it comes, which sometimes makes for lack of perspective on improvements needed. And in small plants, where the duties of the manager may also include cutting of the meat, it is highly possible for him to be so tired at the end of the day that thinking and planning are just not in the picture. These conditions make it even more important that the plant be built right in the first place with every door, light fixture, and especially the refrigeration equipment planned for efficiency.



The recording thermometer, required by law in some states, is a constant reminder that temperatures are important.

As a general rule, the locker operator is not a refrigeration expert. He should certainly be assured of the right capacity equipment for the size of job his plant will do, and refrigeration equipment headaches should not be among his other headaches of the first year of operation, Many locker plants are located in areas where there are no well-trained low-temperature refrigeration men to call in at a moment's notice. It has been suggested that, in some instances, it might be a good thing if the contractor would include in his fee enough additional money so that he could afford to keep a refrigeration man on the job enough of the time during the first few weeks of operation to make all the necessary adjustments in the equipment and to train the operator in its care.

Need for Bulk Storage

For years some of our frozen food authorities have been trying to get available space in locker plants away from the limitations of

A large part of the success of the locker plant depends on the butcher and his willingness to forget selling-to-make-a-profit methods, which are so important in retail store operations.

Tests are made to show how long it takes for meat to freeze. Then the operator knows how rapidly food should go through the sharp freeze room. A small operation can very easily be overloaded.

a 5 or 6 cubic foot box. This has been done in some plants by including bulk storage space. That works fine until all the lockers are rented; then, in order to rent more lockers, the bulk storage is taken for them. Then the same old problem is back again. In towns or communities where there are hospitals, schools, hotels, restaurants, and bakeries there is considerable advantage in having bulk storage space and in doing the necessary promotion to get it used by them.

The locker patron appreciates having room for overflow food during peak seasons and is more likely to go on a more nearly complete diet of frozen foods if he knows he is not limited in the amount he can store in the locker plant by the little box. Any person planning to build a locker plant might wisely look into the benefits that a fairly spacious bulk storage room—never to be taken up with additional lockers —would offer to his business.

Need for Low Cost Packages

Adequate packaging materials at reasonable prices would be a big help to the locker operator. Unfortunately, some very poor packaging procedure and some very poor materials got well established during the war. As in other things, it is easier to learn right than to "unlearn" and start all over again. The over-all picture of locker plant packaging of frozen foods is not good. Much of the fault lies in the price of the adequate materials, though some of the fault lies in the operator's lack of knowledge in what he should have and why. In some instances it is not easy for a patron to understand why prices go up just because of a change in the type of packaging material. He is interested in the quality of his product, but often he does not fully understand the relationship between the quality and the package itself.

Many good articles have been written on packaging materials for frozen foods. Many good looking, well dressed salesmen are on the job, but still the answer has not been given to the locker plant operator. He, in the main, does not realize that the material that is the cheapest per pound may not wrap the most food; he does not know in many instances, that even if the material is moisture-vapor proof there is no advantage in using it over one that is not so good unless it is going to be handled in his plant in such manner that it will not be punctured or rubbed off or in some other way be made inadequate. Much valuable research has been done on packaging materials, but too much of it has been done under conditions and in situations that have never been, and will never be, found in locker plants, and by people who are not familiar with locker plant operations.

Pie fruits are stored in the bulk storage space of a locker plant for a local bakery.

It is a known fact that locker operators as a whole are people not trained in food technology. Often a locker plant opens with none but the butcher having more than an eating acquaintance with food. If there is good managerial ability and an honest desire to do a good job, that situation can have its advantages. In Letters to the Editor in the July, 1946 Food Industries, some very good thoughts were expressed in "Freezing Should Be Weaned." Too many people have tacked on freezing as just another food preservation method without realizing its superiority over anything else we have yet known.

Some basic information on the handling of food is necessary in a locker plant and many sad finished products are a result of a lack of that basic knowledge. Somebody must know, and act on the knowledge, that speed is the keynote in handling fruits and vegetables — that more than average care must be taken with the meat—that all of

Bulk storage bins are an important feature of locker plants that serve institutional trade.

the little things that sometimes do escape the untrained eye, but make for quality of food, must somehow be taken care of in the locker plant.

The locker plant should go a step further. It should follow up its good product to see that the consumer knows how to handle it so that it will be eaten as a superior product. There is a distressingly weak link in the chain between the research worker *in* and the consumer *of* frozen foods, and the locker plant is swinging on that link. Can the home economist strengthen that link? Has she a place in the locker plant?

Promoting Better Use

The home economist doing frozen food educational work without the locker plant viewpoint is a different thing from one doing frozen food work with an understanding of the workings, the needs, the capacities of a locker plant. If she does not actually know what goes on in a locker plant and *what can go on* in a locker plant she may do the plant more harm than good in her attempts to educate the public. But somebody is going to give out information. It behooves the locker plant to take care of its own business.

I cannot agree with some of the authorities that frozen foods should reach only the top group — those who have always used the very best of fresh foods. If that is all that frozen foods are to do, then they have missed the boat. There is an unparalleled opportunity for a better fed nation—for leisure time for the homemaker to devote to preventing delinquents rather than spending most of her time feeding the bodies of her children; for food preparation to be pure fun in the home rather than a dreaded task. There are many unopened doors that can be opened with frozen foods, but they will not be opened if frozen foods are too high priced to feed the average people of our nation. Locker plants should have—and many of them do—farmers for a large percentage of their patrons. The farmer has already put money, efforts, and much labor on the food before he brings it to the locker plant. He is not willing (and much of the time cannot) spend an unreasonable amount just to keep that food. In fact, he knows all the tricks of processing and storing food other than freezing, and he will use them if prices are too high for him. He has children to send to town and educate, and he cannot spend too high a percentage of his cash on the processing and storing of his food.

Need to Follow Through

People are accepting the importance of nutrition in the foods world today, and a part of the whole frozen food business is built on claims of its higher food values. This has to be followed through. Unless the food values are kept through all the processes until the food finally sits in front of the family on the dinner table, then there is no use of its being there in the first place. No longer do people question the importance of proper nutrition . . . no longer do they merely tolerate the nutritionist. Doubtless the poem poking fun at her as a complete nuisance that was published in FOOD INDUSTRIES a few years ago would never get by the editor today . . . that is evident by a recent reference to the errors of some nutritionists rather than including them all in the error makers!

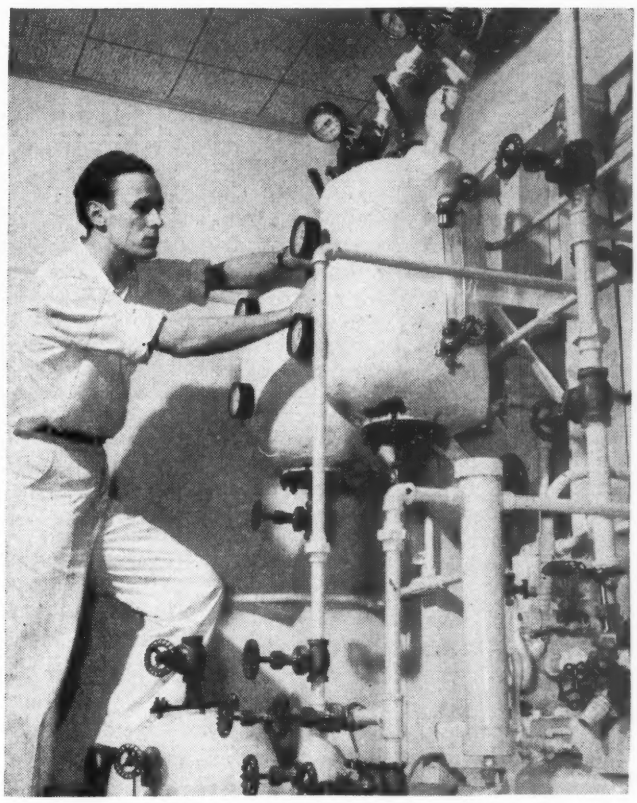
The locker plant fills a tremendous need in a community, even without all of the improvements that it will eventually make. Something great has happened in any community where locally grown food is processed, stored, and used locally. As the locker plant operator begins to feel more secure in his operations and branches out into commercial freezing or distribution of commercially frozen foods he becomes even more valuable to the community.

Home demonstration agents are valuable in showing people how to make the best use of their lockers. They must, however, know all about plant operations.

Conversion Process Retains Rice Vitamins

By use of vacuum and pressure, the water soluble B complex vitamins and minerals from the hulls, bran layer and germ of the rough rice are forced into the endosperm of the rice grains. By application of heat, the starch of the endosperm is gelatinized, and the nutrients "heat-sealed" within the grains, where they are largely retained after milling, washing, cooking

By W. W. O'DONNELL, Director
Products Control and Research
Converted Rice, Inc., Houston, Texas



In the pilot plant at Converted Rice, Inc., which is a small sized duplicate of the main plant, samples of each shipment of rough rice are cleaned and processed.

WHEREVER rice composes the main item of diet, it is important that this food contain the vitamins and other nutritive constituents found in the bran layers, which are removed when the rice is milled. But, for some reason, thought to be largely psychological, almost all consumers prefer the white milled rice to brown rice (unmilled rice).

For centuries, people in parts of India have used a traditional method of parboiling rice, then spreading it on the ground to dry in the sun, after which it is milled. This method requires steeping from eight hours up to several days in water at temperatures ranging from 120 to 190 deg. F. Ordinary parboiling methods achieve diffusion of the vitamin B complex only to a limited depth in the endosperm; therefore, the later presence, or content of these vitamins in the grain is largely dependent upon the degree of milling of the parboiled grain.

The water permeation of the interior of the grain in the ordinary parboiling process depends entirely upon the power of imbibition of the grain, and the duration of the steeping stage. The steeping water penetrates into the interior of the grain very slowly, and more or less by stages. First, the cuticle must be softened by the water, so that a sufficient amount can penetrate to the underlying layers until the center of the grain is reached. By the time this is accomplished the outer layers of the grain are soft and soggy, yet the center of the endosperm has been supplied with only enough water to prevent complete dryness. Steeping during parboiling must continue to this extent because dry spots in or near the center would become apparent as white points, or "white bellies," after the grain is dried. Such rice has inferior market value. It is obvious, therefore, that the closer to the center one goes the less water-soluble vitamins and minerals will be present and, the further away from the center, the greater the presence of these nutrients. Aside from this, in the parboiling process, the permeation of the grain by water is so time-consuming that a large portion of the water-soluble nutritive constituents of the surface layers diffuse into the steeping water surrounding the grains and are lost.

In processing Converted* Rice, the steeping water is driven forcibly into the grain structure which has been made receptive through vacuum treatment, and the surface layers have only slightly higher moisture content than the interior of the grain by the time the relatively short steeping process is completed. Forcing the water into the grain produces more or less a "one-way traffic" and little opportunity is allowed the water-soluble constituents of the layers to diffuse into the steeping water.

The H. & R. process for the production of Converted Rice was originated by E. G. Huzenlaub (London, England) and U. S. Patents were first issued to Mars and Huzenlaub in 1941. It is produced in the United States by Converted Rice, Inc., who now operate a modern Converted Rice plant in Houston, Texas. The process utilizes vacuum, heat and pressure to permeate the endosperm of each grain of rice with water containing the water-soluble vitamin B complex

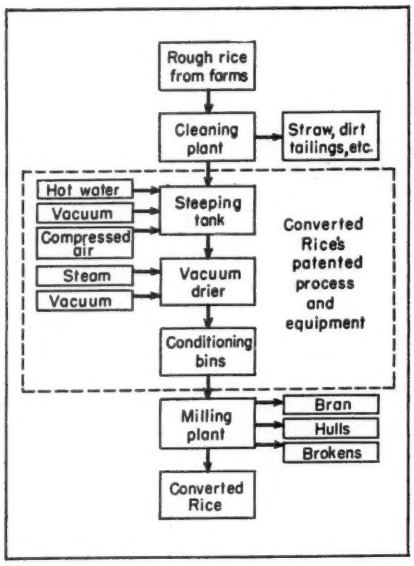
*The trademark "CONVERTED" is owned by the processors, Converted Rice, Inc., P. O. Box 1752, Houston, Texas.

and minerals, and other whole grain properties found in the hulls, bran layers and rice germ. During subsequent processing, these nutrients are "heat-sealed" into the grain and largely remain there after milling, washing or cooking.

Appearance Transformed

From the viewpoint of the food technologist this process holds more than passing interest, because the process used in producing Converted Rice transforms the appearance of the chalkiest kind of rice into one with a high degree of uniform translucency, with a tint like that of the highest grades of rice obtainable. The gelatinization of the starch produces a closeness of structure of the endosperm superior to that of even the very highest grades of rice, and provides a greater resilience and resistance to breakage during milling. Millers of ordinary white rice recover approximately 40 percent of white head rice from some rough rice whereas it is possible to recover 65 percent, or better, of any variety of Converted Rice.

In the process of milling brown rice to white polished rice, as much as 76.3 percent of thiamine, 56.6 percent of riboflavin and 63.0 percent of niacin are removed and lost for human consumption. In 1941, at Converted Rice (Houston, Texas) a 60-gram sample of raw rice was milled and analyzed for thiamine, riboflavin and niacin. Eleven other 60-gram samples of the same batch of rice were processed separately with slight variations in temperature, pressure and duration of treatment. After processing, these samples were milled to the same degree as the raw milled sample and all were analyzed for thiamine, riboflavin and niacin. This was repeated with another batch of rough rice of which two samples



Sequence of operations in the production of Converted Rice from rough rice.

were processed and milled while a third was milled to the same degree without processing.[1] Results of these tests are tabulated in Table I on the opposite page.

Weevil Resistant

Converted rice may be stored for long periods without deterioration and it is especially resistant to infestation of insects. The gelatinized surface of the grains does not allow a hold for the mandrels of weevils. They are unable to attack the grains for feeding and egg laying purposes. The process employs temperatures which destroy or inactivate the lipase enzyme, (present in all rice), and thus any degrading effects of the enzyme during storage and transportation are completely eliminated.

[1]Information on the vitamin tests, together with description of some rice cleaning and milling machines are taken, with permission, from The Nutritional Improvement of White Rice, M. C. Kik and R. R. Williams, for the Committee on Cereals, Food and Nutrition Board, National Research Council No. 112, June, 1945.

Plant of Converted Rice, Inc., Houston, Tex., erected in 1944, employs 170 people.

Production and Consumption

All but a small fraction of the world's supply of rice is grown under irrigation and the product of this type of culture is called lowland rice.[2] Upland rice is grown without irrigation on slopes or level land where rainfall is fairly high. Upland acreage, as well as upland yield per acre, is much less than lowland in all countries where rice is an important crop. Yields per acre of lowland rice reach 28 barrels (162 lb. per bbl.) under the most favorable conditions. Asiatic yields average about 8.3 bbl. per acre.

Of a total world production of 115 million tons, 109 million tons of rice are produced in the Orient. Sixty percent of the Oriental production is in China, 27 percent in India, 8.3 percent in Japan and lesser percentages in other countries.

Rice was first introduced in the United States in 1685 at Charleston, S. C., and is now cultivated as lowland irrigated rice in Louisiana, Arkansas, Texas and California. The estimated crop in the United States in 1944 amounted to 19 million bbl.,[2] an increase of 80 percent during ten years. It is, however, about one percent of the world production. Average yield for the United States is about 13 bbl. per acre. (One bbl. equals 3.6 bu.)

United States production far exceeds the domestic consumption. A fourth of the crop goes to Puerto Rico, Hawaii and Alaska; a fifth is exported, now mainly to Cuba.

Varietal Differences

Apart from seed variations, climatic conditions, soil and irrigation prevailing in the different regions in which it is grown are the controlling factors determining the chemical composition, and physical properties of the rice. A favorable combination of all these conditions is found between the 30th and 40th parallels of latitude in both hemispheres.

Although there are several varieties of rice grown in the region from which Converted Rice draws its raw supplies, the one mostly used in the process is Texas Patna rice. This variety meets with domestic requirements of high quality as it is a long-grain, translucent, (not transparent or glass-like until processed) grain with a hard but resilient structure.

The processing of rice serves, to

[2]Reid, W. M., Estimate of the Rice Crop for the Year 1944. The Rice Miller's Ass'n., New Orleans, La.

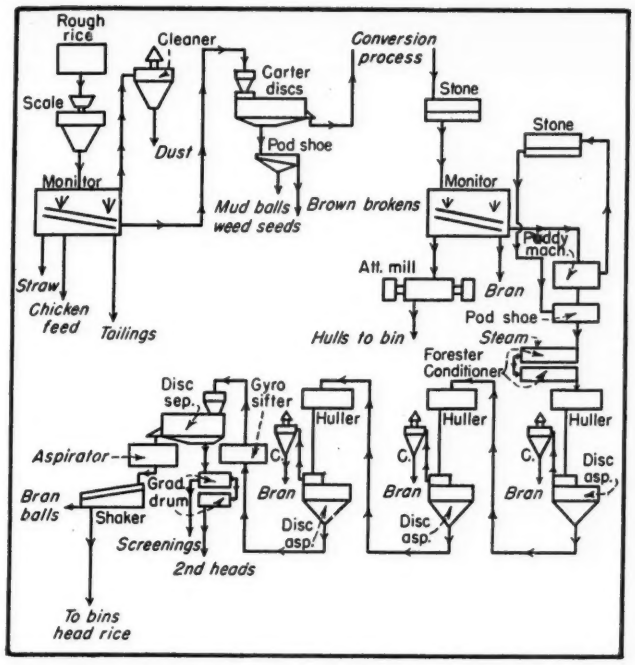


Fig. 1. Flow diagram of operations, before and after the conversion process, at the plant of Converted Rice, Inc., Houston, Tex.

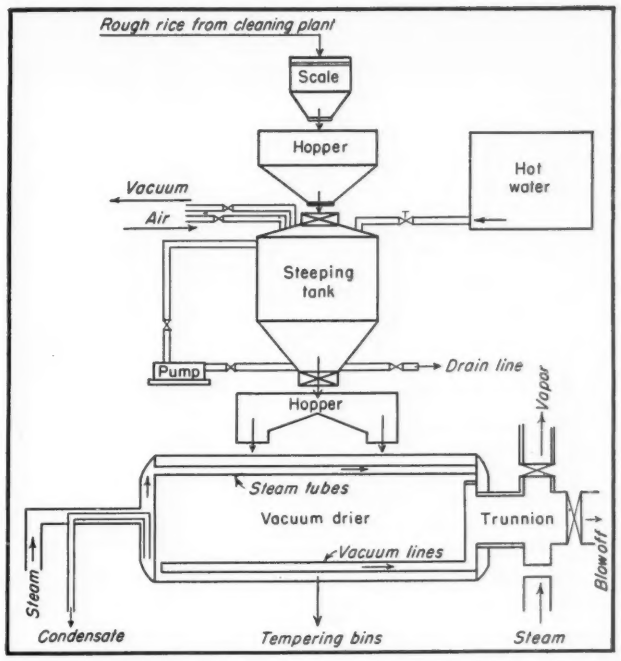


Fig. 2. Flow diagram of rice conversion process showing gravity flow of rough rice from hopper scales to vacuum driers.

a large extent, as a correction of nature in respect to insufficiencies and omissions during the natural growth. Processing exerts a beneficial influence in cases where, owing to imperfections in the development of the grain, especially during the latter stages of its ripening process, there are unsatisfactory conditions in the structural arrangements and lack of transparency of the grains.

Cleaning and Grading

As in all grain cleaning and milling operations the rice miller faces a dust disposal problem. The rice after harvesting has been held in field storage plants and has not been cleaned. Throughout the Converted Rice plant there are aspirators which are connected to every piece of equipment or machinery from which dust would arise from mechanical operation.

Incoming rough rice arrives at the plant in box cars or trucks and is elevated to an upper floor (see Fig. 1), where a sample is taken mechanically for laboratory tests, and it is then weighed. This original weighing will include considerable extraneous material (chaff, mud balls, twine and weed seeds) which the company's buyers have already considered in arriving at the price of rough rice to growers. From the scale, the rice flows into a cylindrical separator, with a revolving central shaft to which are attached a series of perforated metal discs, of a diameter equal to the inside diameter of the cylinder. As the discs revolve through the rough rice, the perforations pick up most of the extraneous material. Strippers then remove this waste material and it is discarded. Screw conveyors move the rice from the point of egress to concrete rough rice storage bins.

Centrifugal Separators

From the bottom of the rough rice storage bins, the rice is conveyed to a receiving separator which is a shaker-cleaner, operating on a sieving principle. For further cleaning it passes to centrifugal separators where the rough rice flows over a revolving cone. An aspirating fan removes dirt and light grains.

The rice is then transported to disc separators which involve rotating discs within a cylinder. These discs have pockets of graduated size capable of elevating small particles and rejecting the larger ones. In these separators the remaining small light grains and broken grains are separated from the full grains. Underneath there is another separator through which the discarded grains, from the separators above, are subjected to a reclaiming operation. The full grains are conveyed to the clean rough rice storage bins, and the broken or small rice (broken rice consists of pieces varying from $\frac{1}{8}$ to $\frac{5}{8}$ of a grain—all other pieces are discarded as feed) flows to a pod-shoe (another type of shaker-cleaner operating on a sieving principle) and is then conveyed to a separate bin.

Processing

Clean rough rice is elevated from the bottom of the storage bins to an automatic hopper scale. This scale weighs and dumps the rice into an accumulating hopper. After sufficient rice is accumulated for a batch it is dumped into the steeping tank.

The steeping tank is connected with a vacuum system, water supply and compressed air system. When the batch is dropped, all valves are closed and a high vacuum is created. The rice is exposed to

TABLE I—Thiamine, Riboflavin, and Niacin in Raw and Converted Milled Rice. (Laboratory)

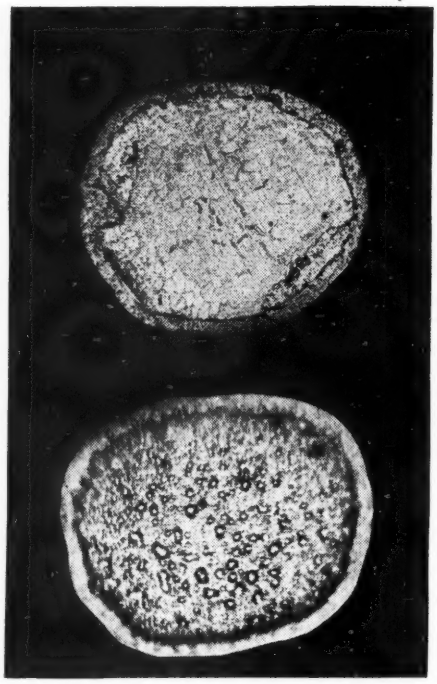
Laboratory Sample	Thiamine		Riboflavin		Niacin	
	Raw µg/g	Converted µg/g	Raw µg/g	Converted µg/g	Raw µg/g	Converted µg/g
0	.82	...	.285		24.3	
1		2.42		.380		44.0
2		2.90		.456		52.0
3		2.32		.390		48.8
4		2.14		.364		45.3
5		2.23		.356		46.9
6		1.99		...		43.1
7		2.16		...		...
8		2.90		.401		51.2
9		2.47		.401		43.5
10		1.90		.349		33.9
11		2.29		.400		48.9
18	.53	...	.317	...	15.1	...
16		2.46		.520		46.8
17		2.73		.500		39.5

this vacuum to remove all air from the grain in order to allow a more rapid and complete penetration of the steeping water. Hot water (approximately 200 deg. F.), in sufficient quantity to cover the rice, is introduced under 100 lb. pressure and the rice is steeped until it is completely permeated with water, approximately 190 min. Required water temperature is maintained by thermostatically controlled automatic heat regulators, located at the base of each tank.

The hot water is forced through the hull and the underlying layers into the endosperm of each grain. Times and temperatures of this treatment vary, depending upon the specific characteristics of the type of variety of rice grain, its moisture content, length of time it has been in storage and the color desired in the final product. In this steeping operation the water-soluble vitamin B complex and minerals are carried from the outer layers (the hull, bran and germ) into the endosperm of the grain. As soon as this has been accomplished, the steeping water is drained off through outlets at the bottom of the tank and the steeped rough rice is dumped through a valve at the bottom of the tank into large, cylindrical, rotating, steam-heated vacuum driers.

Driers

The driers are jacketed and have steam tubes, which hold steam at low pressures and corresponding temperatures. Between the steam tubes there are vapor channels and both steam and vacuum enter and leave the driers through trunnions at the ends.



Photomicrographs of cross sections of kernels of milled rice. (Above): Converted Rice. (Below): Ordinary white rice. Note compact interior structure of Converted Rice, due to steeping and heat treatment.

When the steeped rough rice is introduced into a drier, it is subjected to vacuum and heat to remove vapors and moisture accumulated by the rice during the steeping period. Dry, direct steam is then introduced in order to gelatinize the starch in the grains. The steam is blown off and the rice is held under vacuum until its moisture content is lowered to the proper level for milling. Samples are taken from the vacuum drier, through a sample-cock, at 30 min. intervals for moisture determination.

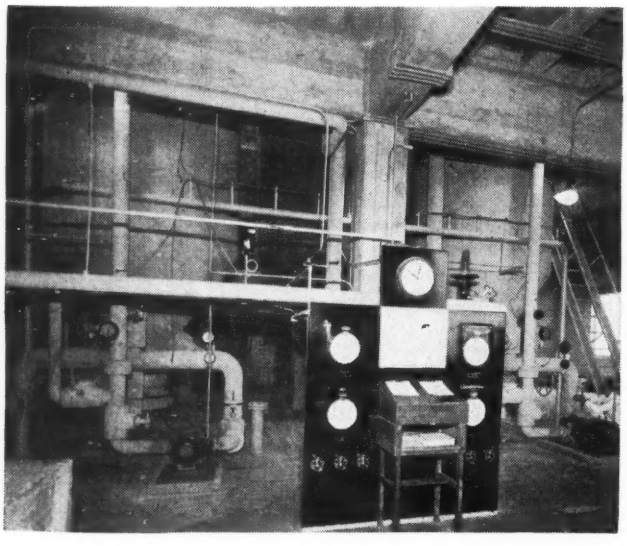
The hot, dried, processed rough rice is then conveyed to bins where it is cooled, by passing air through it, and stored for a "tempering" period in order to equalize the moisture content of the batch.

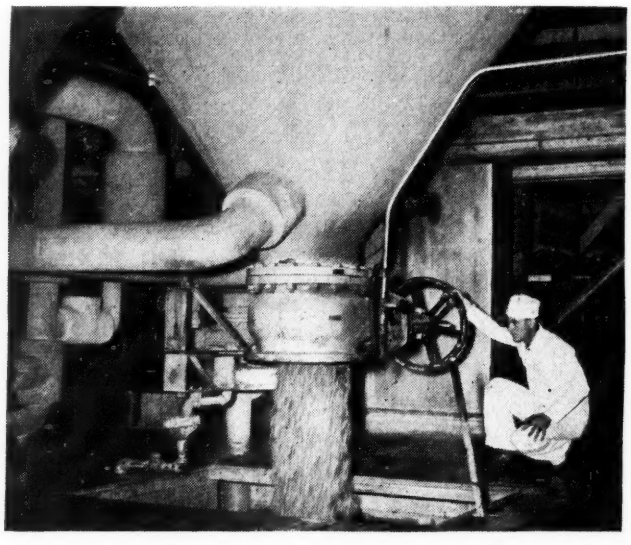
Milling

From the conditioning bins the processed rough rice is conveyed to shelling machines, or stones, for the removal of the outer hulls. These machines consist of round stones about 5 ft. in diameter, mounted on opposed steel plates, one of which is stationary, the other rotating at about 190 rpm. The plates are mounted horizontally with the stones spaced approximately ¼ in. apart. This spacing may be adjusted to the mean length of the grains to be shelled. The stones, which must frequently be replaced due to abrasion from the tough rice hulls, are composed of rough carborundum, emery and magnesium chloride.

The rough rice passes through an aperture in the upper plate, which in some machines is stationary; in others, it is the rotating member. As the rice passes into the space between the stones, the grains are oriented at random and, as they are turned to a nearly horizontal position, they are caught and the hulls cracked off by the impact. Careful adjustment of the space between stones is necessary in order that the machine will shell as large a proportion of the grains as possible with a minimum of breakage. Some of the shorter grains, however, escape being shelled.

The hulls are removed by strong aspiration and conveyed to an attrition mill. After grinding, they





In the steeping tanks the cleaned rice is exposed to vacuum to remove air from the grains. Hot water is then introduced under pressure, carrying the water-soluble vitamin B complex and minerals from the outer layer into the endosperm. (Left): Steeping tank floor showing steeping tanks and control panel. (Right): Dropping a charge of rice from steeping tank.

go to storage bins to await sacking for use as fuel, feed or fertilizer.

The unhulled rice is separated from the hulled rice by a paddy machine, which consists essentially of a slightly tilted, smooth, steel plate operating with a horizontal reciprocating motion. It is provided with baffles which distribute the rice over the entire surface and insure ample overturning of the grains as they descend the slope. The smooth brown rice falls off the lower edge while the rougher and lighter unhulled grains ascend to the upper edge and fall over a slight lip into a conveyor which carries them to another shelling machine. In this shelling machine, which has a closer set of plates, all of the processed unhulled rice is shelled and, with the previously hulled rice, is conveyed to a pod-shoe (shaker cleaner) for a final cleaning and separation from chits (small broken grains).

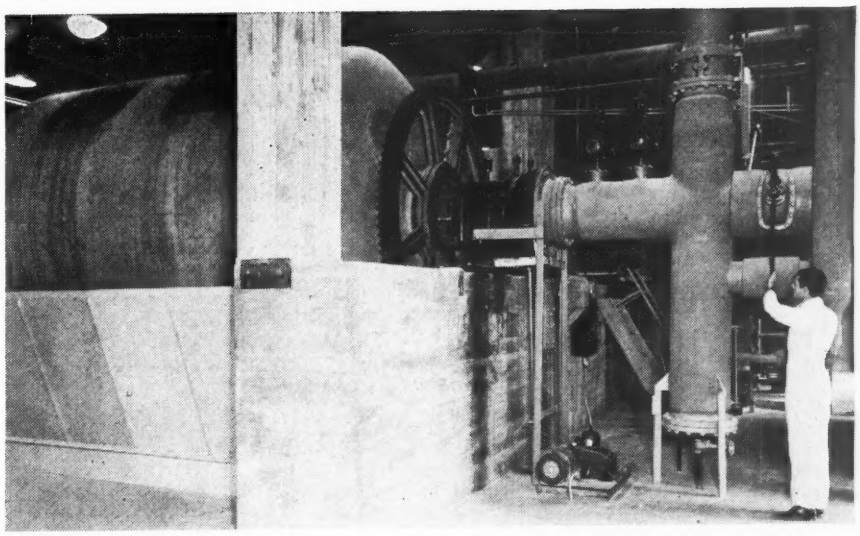
Scouring

The rice then flows to a conditioner to soften the outer layers of the grain, and then to the first "break" hullers, or rice mills, where a small amount of amorphous limestone is added to act as an abrasive.

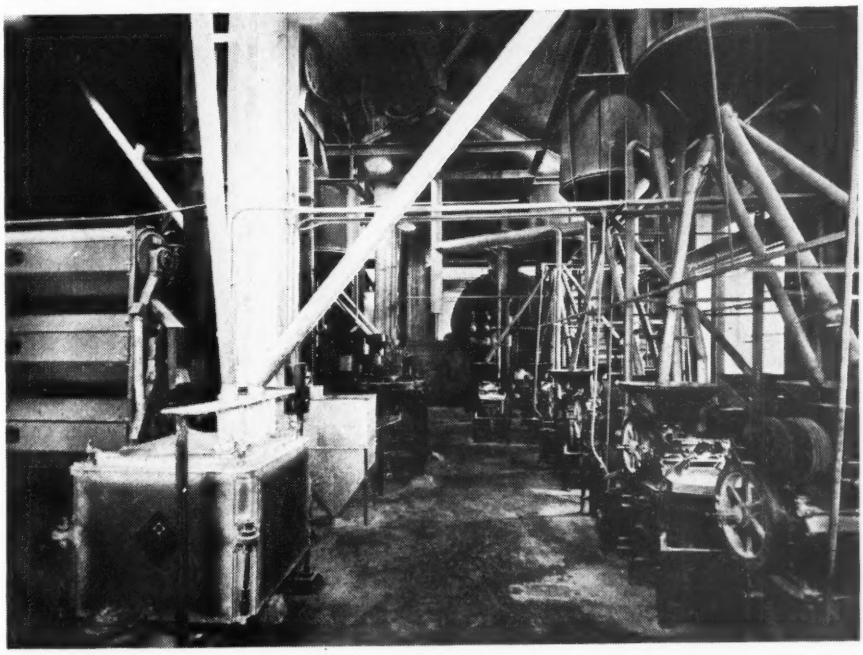
These machines are erroneously called hullers because they were originally designed to remove the outer coverings of coffee beans. In the trade, this operation is referred to as "rice milling" although others prefer to call it "scouring." The machine consists of a solid heavy fluted cylinder, rotating at 500 to 600 rpm. within a stationary hollow cylinder of thin sheet steel which is uniformly perforated by closely spaced slots about 0.060 x 0.300 in. (a range of sizes is provided). The perforated cylinder is composed of upper and lower halves, the edges of which abut, and is enclosed by an outer shell. The flutes on the rotating cylinder are so disposed as to carry the rice along, and to cause it to travel around and around the inner surface of the perforated cylinder. A suitable opening through the perforated screen admits the rice at the top at one end and another permits its egress at the bottom of the other end.

In operation, the entire hulling machine is continuously packed full of grain. The outflow and, accordingly, the packing force, is regulated by a blade running the full length of the cylinder, which protrudes between the upper and lower halves of the perforated cylinder and approaches the flutes of the rotating cylinder within, thus retarding the movement of the grain lying next to the perforated cylinder. The action of the machine is, therefore, essentially one of scouring the moving inner mass of rice grains against those near the surface of the perforated cylinder which are retarded by the blade. By this means the bran is progressively scoured off the grains, falls through the perforated screen and is carried to a storage bin by aspiration.

When the blade is set closer, the rice within the hulling machine is subjected to denser packing and the effluent rice is caused to become whiter. Considerable skill and experience are demanded of the miller in order that efficient removal of the bran, without excessive breakage of the grain, may result from milling. The grain is markedly heated by friction, a factor that must be kept within a certain limit.



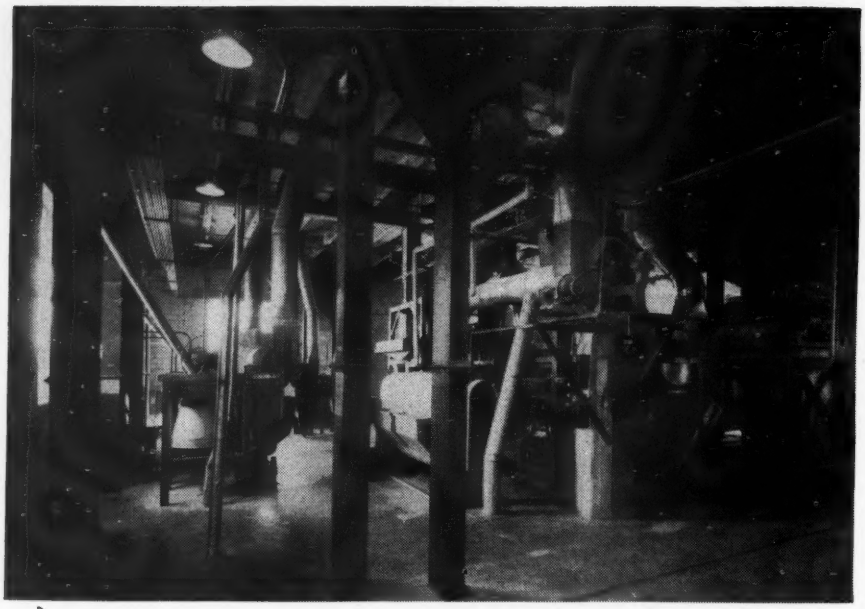
Rice is dropped from the steeping tanks into large, cylindrical, rotating, steam-heated driers where vacuum is applied to remove excess moisture. Dry steam is introduced to gelatinize the starch in the grains, followed by the application of heat and vacuum to reduce the moisture content to the proper level for milling.



Interior of mill-stone and huller floor, where hulls are cracked off rough rice.

Five Break Mill

Converted Rice operates a 5 "break" mill. The first "break" with a group of five mills is fed processed brown rice by gravity from a hopper located directly above the group of mills. From the first "break" the rice is elevated to an aspirator, then returned to a hopper located over the second "break" of five mills. This same process is repeated for each of the five "breaks," after which the now processed milled rice is conveyed to a gyro-sifter, where screenings and residual particles or dust are removed from the rice. It is then conveyed to another disc separator which separates all broken rice from head rice (or whole rice). It flows to a final pod-shoe, which removes any "bran-balls" ("bran-



Interior of mill-aspirating and separating equipment, for removing hulls from rice.

Vitamin and mineral assays are made on every batch of Converted Rice.

balls" accumulate in conveyors and gravity feed pipes) and is conveyed to processed whole grain milled rice storage bins to await packaging or bagging.

The broken rice is given a reclaiming, or second separation, in speed drum separators which are a series of three disc separators, where some whole grain rice is recovered from the broken grains. Processed broken milled rice then is conveyed to another storage bin to await packaging or bagging.

Because processing tends to make the rice grains more resistant to breakage during milling, a high percentage of all rough rice processed by Converted Rice is recovered as extra fancy head rice. The remainder is sold as Converted second head rice (pieces of ½ grain to ⅝ grain in size), and progressively smaller portions of the total output are offered as broken rice, screenings, and brewers' rice.

Company Data

Converted Rice began operation in Houston on a laboratory scale but soon expanded into a commercial scale operation in a plant equipped for this purpose. In 1944 a larger plant was constructed at a cost of approximately $850,000. The plant employs 170 people. Until recently, the entire production output was taken by the Armed Forces and is presumed to have been shipped into Oriental areas where military operations have been in progress. Reintroduction of Converted Rice in retail markets was recently announced.

The patents are owned by Mars & Huzenlaub, 402 Rusk Building, Houston, Texas, and Converted Rice, Inc. operates under licenses from Mars & Huzenlaub. Forrest E. Mars is chairman of the board of Converted Rice, Inc., and Gordon L. Harwell is president.

Future of the Industry

With a 50 percent estimated increase in domestic rice production in the United States since Pearl Harbor, of which the greatest portion was exported, this industry is facing a somewhat hazardous future. Historically, some 40 percent of the entire domestic crop has been exported. And, because the lowest offering price from the export market seemed to become the highest possible domestic price, this expanded production—with little or no known increase in domestic per capita consumption (5.6 lb. per year —1937) seems to indicate a potentially rapid decline in the domestic rough rice market. This danger will be magnified within a few years, since with the defeat of Japan, cheap rice, grown and harvested by low paid Oriental labor, will flood our export markets from the traditional rice bowl of the world where 95 percent of the rice moving in international trade is produced.

But, although the processed product is still termed rice, it is a new product with higher nutritive qualities than ordinary rice. Even an inexperienced cook can prepare it so that each grain retains its integrity, remaining plump and separate, and there is little danger that the cooked product will become a starchy mass, as often occurs with other rice. Converted Rice can be successfully canned and combines readily with other canned foods in which rice is used, especially soups and poultry.

Consumers have readily accepted Converted Rice, and the corporation has made definite future marketing plans. The company emphasizes the fact that the past several years have amply demonstrated that consumers readily accept a new product that has better flavor, higher nutritive content and is more easily prepared than its predecessor.

Rice Technology

Variations in raw material make the operation of a pilot plant highly advantageous. Characteristics of the crop depend on the cultivation and growing conditions. Certain factors such as rainfall, temperature, rate of evaporation and sun·

(*Continued on page* 210)

Using Froth Flotation To Clean Vined Canning Peas

Automatic regulation of flotation separation is possible with a new device that adds wetting agent at the proper rate, thus controlling the amount of air in the foam. The author tells how to make, set and service the regulator

By A. M. NEUBERT
U. S. Fruit and Vegetable Laboratory, Pullman, Washington*

A FROTH flotation process for removing troublesome foreign materials from vined peas was developed experimentally in 1942 to 1943,[1] and applied on a semi-commercial basis in 1944 to 1945. A description of the process, giving details of equipment, reagents, and operation, was published in 1945.[2] Commercial application in 1946 demonstrated the value of this process as an added in-line cleaning operation for small sieve peas generally. Continued experimentation on a commercial scale has resulted in improvements in equipment design and in the development of an apparatus for regulating the separation process.

Principle of Froth Flotation Process

The froth flotation process depends on differences in wettability between sound peas and certain foreign material. In contrast, the usual flotation washers and quality graders operate on differences in density of the materials separated. By controlling the wetting properties of a water solution, it is possible to wet out selectively sound peas from foreign materials. The easily wet peas will sink in such solution, whereas the less easily wet foreign material tends to float. Finely divided air bubbles, dispersed through the solution, increase the buoyancy of this foreign material. Natural differences in wettability are increased by treating the mixture with a light mineral oil, thereby increasing the efficiency of the separation.

The process, as now developed, employs a surface-active agent, sodium lauryl sulphate, for controlling the wetting properties of the water used in the separation process. Oil is applied to the material in the form of an emulsion dispersed in the water. Finely divided air bubbles are incorporated into this emulsion through an open standpipe on the suction side of a centrifugal circulating pump. The sodium lauryl sulphate acts not only to control the wetting properties of the solution, but it also facilitates emulsification of the oil and dispersion of the air as fine bubbles. Equipment suitable for operating the froth flotation process on a commercial scale has been described.[2]

Regulation of Separation

Control of the wetting properties of the solution used in the flotation process is the prime consideration in removing foreign material from peas. The wetting properties of the solution used in the froth flotation process constantly change during operation, making continual adjustment necessary. It is fortunate that the net effect of these changes results in a decrease in wetting properties below the point required for efficient separation, since the wetting properties can easily be increased by the addition of a surface-active agent.

The wetting properties of the solution, which are a function of the surface energy, may be measured and expressed in terms of interfacial or surface tension. Although the values obtained from surface tension measurements of the heterogeneous system used in this process are open to question, such measurements have been found a useful guide in studying the process. Reasonably reproducible values were obtained by use of a ring-type interfacial tensiometer when proper precautions were taken.

Measurements of surface tension showed that during efficient separation the surface tension value was constant, provided operating conditions were not varied. Changes in such factors as type and speed of circulating pump and back pressure against the pump resulted in changes in this constant value. It was observed that with fixed operating conditions and with surface tension values of the separating solution greater than required for efficient separation, sound peas floated. When the surface tension values dropped below that required for efficient separation, foreign material would sink and contaminate the sound peas.

Measuring the Air

Measuring the amount of air incorporated into the solution by the circulating pump was also found to be useful in studying the process. This measurement was conveniently made by collecting, with the aid of a petcock, samples of the air-oil-water mixture delivered to the manifold. The sample was collected in a cylinder of known volume and weight, and the filled cylinder was weighed. This procedure proved to be a rapid and accurate method for determining this constant.

Measurements of the percentage

*Conducted under a cooperative agreement between the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture and the Washington Agricultural Experiment Station. Published as Scientific Paper No. 709, Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, State College of Washington.

of air delivered by the pump under a given set of operating conditions showed this value to be a constant during efficient separation. When the percentage of air decreased from this constant, peas would float with the foreign material. When the percentage of air increased, foreign material would sink and contaminate the sound peas. Changes in the value of this constant occurred when certain operating conditions were altered.

The relationship between the efficiency of the cleaning operation, the wetting properties of the separating solution, and the percentage of air in the system suggested the possibility of using, through density, the amount of air dispersed in the solution to control the separating process. An experimental regulator, Fig. 1, was constructed in 1945. This regulator was placed in a commercially operated flotation unit in 1946 and used successfully throughout the season. The regulator simplified solution preparation, increased the cleaning efficiency and reduced the loss of peas occasioned by manual control of the separation.

Construction of Apparatus

The regulator (Fig. 1) consisted of a float and mercury switch assembly, a detergent reservoir, and a pipette and solenoid valve assembly. The float was constructed from two No. 2 tin cans mounted near one end of a 5/16-in. brass rod 24 inches long. A weight was attached on the shorter end of the brass rod and a weight cup and actuating flange on the other end as illustrated. Experience has shown it to be advantageous in adjusting the regulator, to mount the weight cup above the flange. The volume displaced by the float, bottom weight, and rod to within two inches of the weight cup was 1525 ml. The weight of the float assembly, exclusive of shot, was 1251 grams.

It is desirable that as much of this weight as possible be in the bottom weight so that the float will have a low center of gravity. In the experimental model the bottom weight was 555 grams. The float was suspended in a supporting bracket having two guide holes as illustrated. The beam and mercury switch arrangement was mounted on the supporting bracket by means of a knife edge in such a way that the beam was actuated by the flange on the float. The beam was balanced with the mercury switch in an open position but near the closed position by shifting the mercury tube and by counterweights. The spring was adjusted to compensate for the shift in center of gravity of the beam caused by the shift of the mercury in the full open position and exerted no tension when the beam was balanced in the nearly closed position.

The float within the supporting bracket was housed in an 8 x 8-in. mesh screen cage in such a way that solids were prevented from coming in contact with the float and interfering with its action. The entire assembly was mounted in the separation tank in a vertical position with the bottom weight four to six inches above the sinker outlet and the weight cup, flange and mercury switch two to six inches above the floater discharge weir. Care in mounting the supporting bracket in an exactly vertical position prevented binding and reduced friction in the action of the float.

The detergent reservoir consisted of a one-gallon can which was heated by a 25-watt light globe mounted in a compartment near the bottom. One-eight inch, inside diameter, copper tubing was used to feed detergent into the pipette and to vent the pipette. The pipette was constructed of a 5-in. section of $\frac{5}{8}$-in., inside diameter, brass pipe and was attached to a $\frac{1}{4}$-in. solenoid valve by means of fittings constricted to $\frac{1}{8}$-in. inside diameter, as illustrated in Fig. 1.

A two-hole rubber stopper was used to seal the copper feed tube and vent the pipette. This assembly was mounted on the side of the separator in such a way that the solenoid valve would dump detergent into the floater flume below the floater weir. In this way some mixing of detergent and separator solution occurred before the solution reached the pump. It will be noted that corrosion-resistant materials were used in the construction of the assembly.

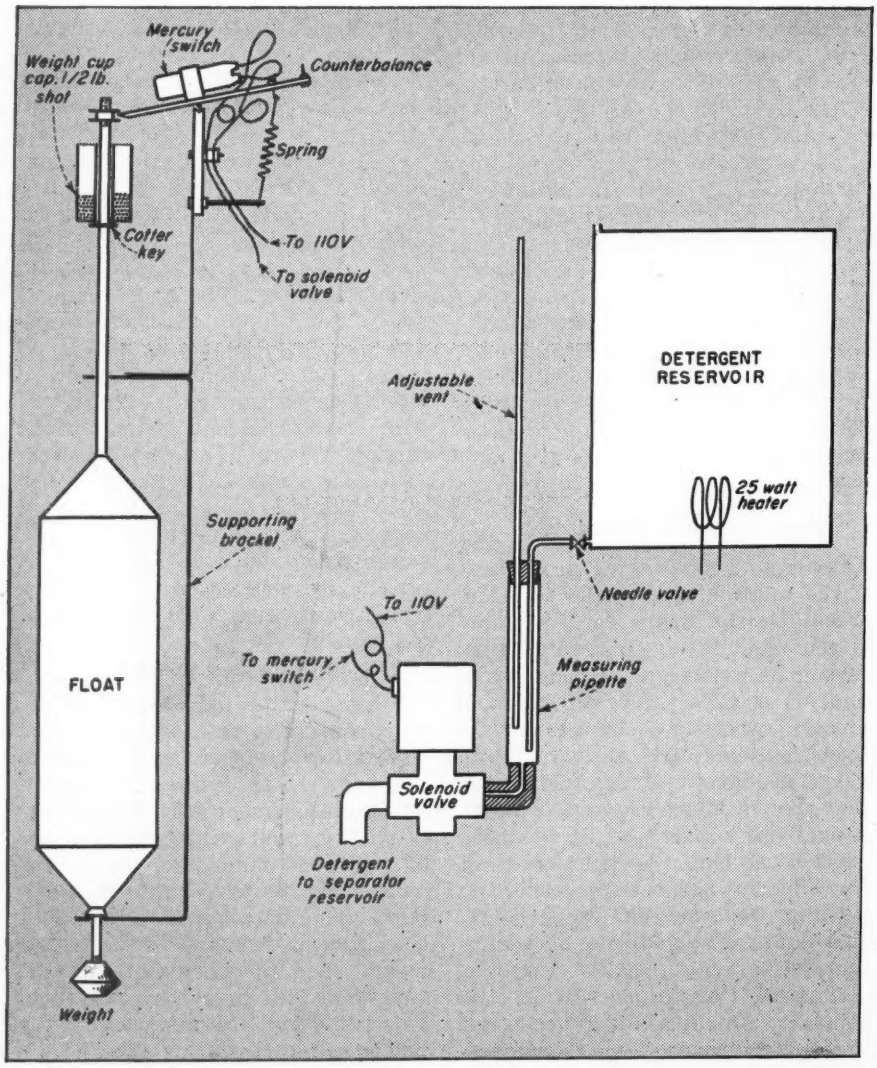


Fig. 1. Separation regulator for froth flotation pea cleaner.

Principle of Operation

During operation the float responds to changes in density resulting from variations in the amount of air dispersed in the separating solution by the pump. Because there is a density gradient from the bot-

tom to the top of the separafor tank, caused by the rising of the air bubbles, the float actually indicates the average density of the solution in which it is suspended.

As the amount of air incorporated into the solution decreases, the average solution density increases and the float rises. The rising float closes the mercury switch, which in turn opens the solenoid valve, thereby allowing detergent to run into the system. The added detergent acts to lower the surface tension, thus increasing the wetting properties of the solution. The circulating pump responds to the lowered surface tension by incorporating more air into the solution, thereby decreasing its density and permitting the float to sink. When the mercury switch is opened by the sinking float the solenoid valve closes, interrupting the flow of detergent, and the operation cycle is complete.

Adjustment of Regulator

Under conditions of efficient separation, the ratio of gross weight of float to submerged volume of float depends on the type of circulating pump, the operating conditions of the separating unit, and the position of the float in the separating tank. The system is adjusted manually in each installation by adding detergent to the desired separation point during the actual operation of the unit. When the desired separation is being accomplished, shot is added to the weight cup until the float just sinks. As long as constant operating conditions are maintained, this adjustment need not be changed. In adjusting the float for efficient separation in a commercial separator, 132 grams of shot were added to the weight cup, giving a gross weight of float to submerged volume of float ratio of 0.907.

The sodium lauryl sulphate preparations used in the process were obtained in the form of a paste which melted into a viscous, clear sirup when warmed. To use these products in the regulator, it is necessary to dissolve them in one to two volumes of warm water before pouring into the detergent reservoir. The heating element in the reservoir prevents precipitation of the sodium lauryl sulphate by maintaining the solution at a temperature of 80 deg. to 90 deg. F.

Adjustment is required of the needle valve and pipette (Fig. 1) in the detergent dispensing assembly. The needle valve on the reservoir is adjusted to permit the flow of detergent solution at a slightly greater rate than is required by the separator during actual operation on peas. This rate varies with the concentration of the detergent solution and the capacity of the separating unit. With a one to one dilution of detergent, a fast drip was found sufficient when operating on a separator of two tons per hour capacity.

The measuring pipette, located between the reservoir and the solenoid valve, serves as an anticipator to compensate for a lag of about 60 seconds that exists between the time detergent is added and the time the circulating pump reestablishes equilibrium between the surface tension and the air in the system. The volume of detergent solution added by the pipette is regulated by raising or lowering the adjustable vent so that a sufficient volume is delivered to the separator to sink the float in about 60 seconds under actual operating conditions. Under conditions previously described for adjusting the needle valve, a pipette adjustment to deliver about 25 ml. of detergent solution during 60 seconds was found adequate.

Operation

When the regulator has been adjusted to maintain the desired separation of peas from foreign material, it is possible to operate the separator with only general supervision to assure that the equipment is functioning properly. In preparing the separating equipment for operation, water and detergent are placed in the separator, the pump started, and oil added through the air-intake standpipe. Detergent is then added manually in small amounts until the regulator float just sinks, whereupon the regulator automatically maintains the proper concentration of detergent. In adding detergent by hand, it is advisable to use a warm one to one dilution to permit its rapid dispersion into the solution.

Several precautions are necessary to insure satisfactory operation. Under no condition should undiluted or cold detergent be placed in the detergent reservoir, and care should be taken that foreign substances do not enter the reservoir, lest the system clog. Occasional inspection and cleaning of the adjustable vent and valve assembly are required to avoid stoppage of the system.

The regulator can only maintain the condition to which it is adjusted. The initial adjustment must be made manually and, if for some reason the regulator lags in its function of controlling the addition of detergent, manual additions must be made until the solution is again at the desired point. Large losses of solution from the systems or a clogging of the manifold will throw the regulator off. A pressure gage on the delivery side of the pump is necessary to assure that the operating conditions are maintained at the point for which the regulator is adjusted.

It is imperative that the separation equipment be thoroughly cleaned and fresh solutions prepared at least every five hours. With prolonged usage, the solutions become contaminated with pea solids, scum collects on the metal surfaces, and an unsanitary condition is created. Juice carried into the separator by the material being cleaned tends to increase the wetting properties of the solution without contributing to its foaming properties, thereby disturbing the surface tension-percent air relationship. Under normal operation this contamination with plant juices is not sufficient to disturb the operation of the regulator during a five-hour run.

Occasionally when small sieve peas, heavily contaminated with skins and other foreign material, are held in hoppers under an accumulation of juice and then passed through the separator without thorough washing and draining, the carry-over of the plant juices becomes so great that the separating solution breaks down. This condition is demonstrated when the regulator adds detergent, even though it is not needed for efficient separation. Under such conditions it is advisable to dump the solution, clean the equipment, and prepare fresh solution.

Equipment Design

Treater Design—To accomplish efficient cleaning in a single passage through the separator, a preliminary treatment of the peas is necessary to condition the surface of the material being separated. The only requirement for this step is that the peas be thoroughly wet with an oil emulsion, similar in composition to the separation solution, and then drained. Both pipes and flumes have been used successfully to accomplish this wetting.

In one installation a hydraulic elevating pump was used, with treater emulsion as the carrying fluid, to accomplish elevation and treating in one operation. The reel used for recovering the treater emulsion should be sufficiently large to permit thorough draining of the

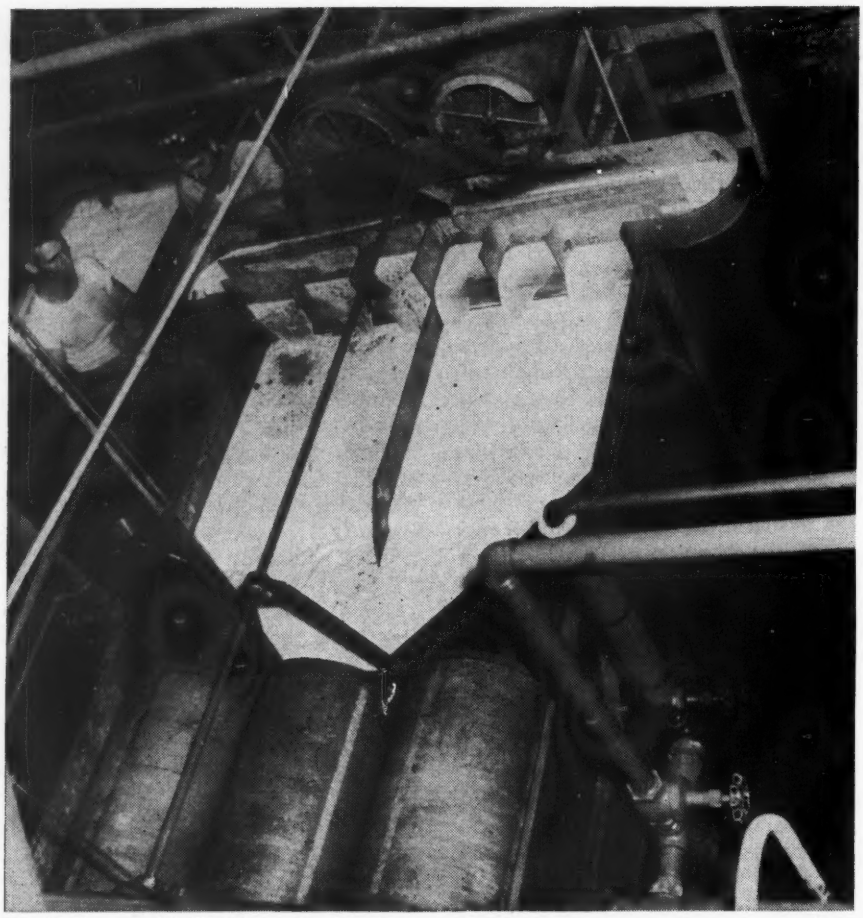


Fig. 2. Commercial flotation unit, showing twin treater dewatering reels, twin spreading flumes and twin separation tanks. Floater waste is removed by center reel in foreground. Sound peas are delivered to tubular blancher in right foreground.

peas. As for pea equipment in general, the treater should be designed to eliminate pockets or obstructions that might hold back individual peas. Peas delayed in the equipment tend to pick up off-flavors and deteriorate in quality. When dislodged after a delay of several hours, the peas may be off-color in the can.

It is necessary during operation to add fresh emulsion to the treater to compensate for oil lost to the material being cleaned. At the same time, some of the used solution must be wasted to maintain a constant volume. A simple, effective way of maintaining a constant volume is by supplying the treater reservoir with an adjustable overflow pipe. After the water has been measured into the treater reservoir and the emulsion prepared, this overflow pipe is lowered so that any accumulation of solution will escape through the overflow. It is important in preparing the emulsion that the oil be added through a standpipe on the suction side of the pump after the detergent has been added. Otherwise, the oil will separate and collect on the surface of the reservoir.

Perhaps the most efficient way to add emulsion from the auxiliary reservoir is by means of a fine spray applied to the peas as they drain in the dewatering reel before passing to the separator. The addition of emulsion of double oil concentration at a rate of about ten gallons per ton of peas cleaned has resulted in adequate oil maintenance in the treater.

Separator Design

The separator should be designed to eliminate pockets or other obstructions that might delay individual peas. A 30 degree slope has been found most suitable for the bottom surface of the separator. To avoid extreme depth in collecting the sinker fraction, commercial separators have been restricted to a maximum width of 30 inches. A separator 30 inches wide has a capacity of about one ton of peas per hour. The units are usually constructed in pairs, with two sinker outlets and a single floater dewatering reel. By using two treater units it is possible to keep peas of two sieve sizes or lots separate. In this arrangement a single pump is used to circulate the separator emulsion, and one regulator, which may be mounted in either separating tank, serves to control the separation of both units.

It is desirable that the surface of the solution be in continuous forward motion across the separator tank to permit rapid discharge of the floating material over the weir. This can usually be accomplished by the arrangement of holes in the manifold used to distribute the air-oil-water emulsion to the separating tanks.

To avoid eddies, the holes should be more concentrated at the entry end of the separator, and the discharge of the flume used to spread and deliver the peas to the separator should be as low as possible. Although untried experimentally, it would appear advantageous to have the bottom of the flume about one inch below the surface level of the separating solution. On leaving the separator the cleaned peas should be thoroughly washed and then delivered to the blancher without delay to avoid the development of off-flavors.

Separator Circulating Pump

The pump used in circulating the separator emulsion is the most critical factor in the operation of the flotation process. As has been previously discussed, this pump serves not only to emulsify and circulate the solution, but also to maintain an equilibrium between the surface tension of the solution and the air incorporated into it. The capacity of the pump must be sufficient to supply the sinker outlet pipes and run solution about ½ inch deep over the weir. The normal capacity of a pump may be reduced by as much as one-half when operating under the condition of the flotation process.

For commercial units having a total weir length of five feet and two 3-in. sinker outlets, pumps having 6-in. inlets and 4-in. outlets have been used. These pumps have been powered with motors of 7½ hp., operating at 1800 rpm. In all of the large units used, the amount of air incorporated by the pump at the point of efficient separation has been about 12 percent by volume. In contrast, smaller pilot-plant units having a 2-ft. weir and using a pump with a 3-in. inlet and a 2-in. outlet operated efficiently when the pump incorporated about 26 percent of air into the emulsion.

Separation of nightshade from peas was slightly more efficient and the sensitivity of the regulator was greater under the pilot-plant conditions. Studies are in progress to determine the factors influencing

(*Continued on page* 206)

Developments in Food Packaging

Successful applications are being made of plastic materials for packaging foods. Many problems are now being solved by making new uses of flexible materials, and by the development of machines for specialized packaging

By JOHN V. ZIEMBA, Assistant Editor, "Food Industries"

THE log jam is breaking in the field of food packaging developments. Important new uses are being made of plastic films and coatings for packaging foods. Among materials being successfully applied are polyethylene and pure or mixed polymers or copolymers of vinyl chloride, vinyl acetate or vinylidene chloride. For the first time knocked-down, rigid cellulose acetate boxes are being fabricated automatically. Pliofilm-lined, insulated shipping containers are being used for non-refrigerated shipments of sea foods. Sauce-filled Pliofilm sacks, packed into cans of wieners and heat processed, are in use to prevent interchange of flavors of the two foods. Packaged foods are provided with better visibility with a new type of non-fogging Pliofilm.

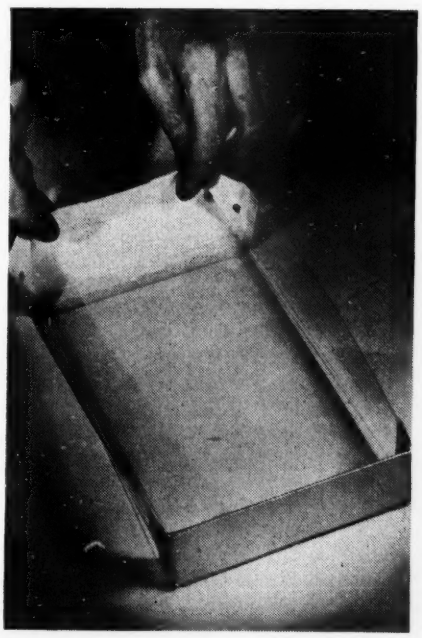
New packaging machines are being designed and developed for specialized products. A machine was demonstrated at the Packaging Exposition in Philadelphia in April for vacuum packaging a large variety of irregularly shaped products varying in size. Development of a new automatic weight indication and control machine assures positive control of package weights. A top labeller automatically prints and heat-seals thermoplastic labels to packages. A new type of wrapping machine is capable of wrapping 800 oranges a minute in Pliofilm. A two-scale machine weighs and fills a variety of foods. Outstanding feature of this machine is its automatic bag releasing mechanism. These new developments in food packaging are discussed in detail in this article.

New Saran Film

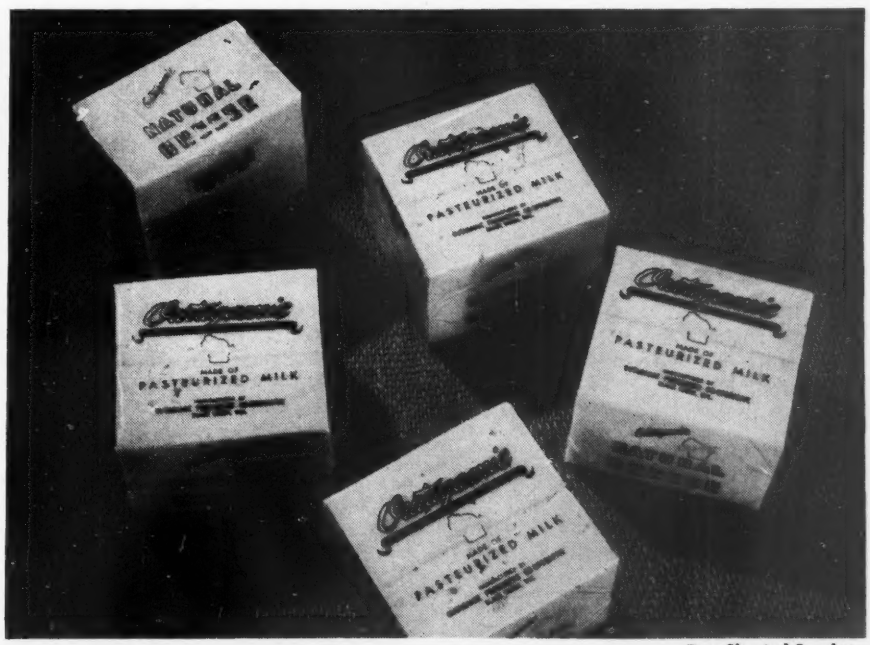
Dow Chemical Co. has announced the development of a new film, Saran Film 517, for food packaging. The film is tough, odorless, tasteless, transparent and pliable over a wide temperature range. It has a low moisture-vapor transmission rate and is a good oxygen barrier. It is unaffected by moisture, common mineral and organic acids, and can be folded and creased without cracking.

Consumer packaging of natural cheddar cheese is one of the first uses of the new film. Being a good oxygen barrier, the film prevents oxidized surface flavor on the cheese. Air pockets, where mold growth occurs, are eliminated during wrapping because of the pliability and the close, clinging adherence of the film to the surface of the cheese.

The new one-ply film can be used in place of double wraps and laminated materials for foods requiring maximum product protection. Further uses in food packaging is in laminated structures, such as film to paper for cap liners, film to foil and film to fiberboard. It might be used for other foods where surface mold growth is a problem.



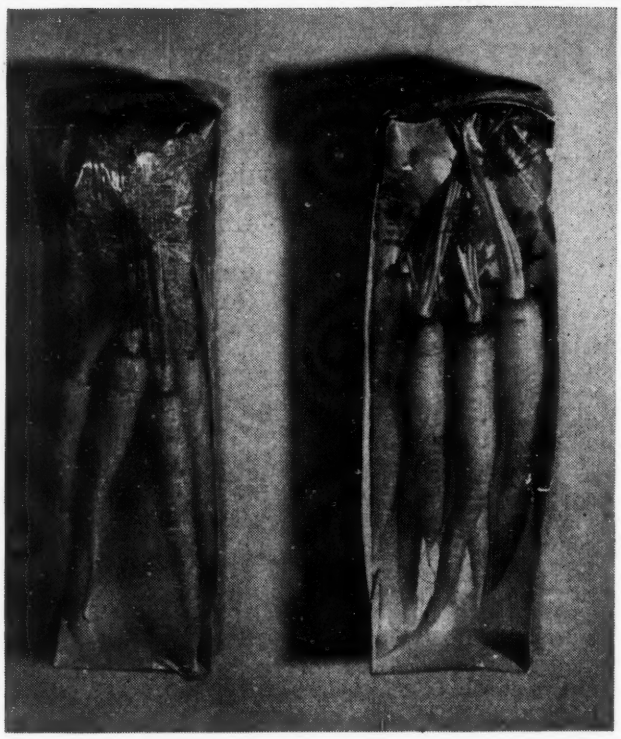
New folding, rigid transparent box, made of cellulose acetate, is easy to set up.



Dow Chemical Co. photo

A new packaging material, called Saran Film 517, is now being used for the first time for food packaging. It is used here as a wrapper for natural cheddar cheese.

Barbecued weiners are now packed in cans with brine with the sauce kept separate in a leak-proof and odor-proof Pliofilm bag.



Non-fogging Pliofilm (right) provides better visibility by preventing moisture from condensing as droplets inside the film.

Sack-in-Can Package

A new food package, developed by G. O. Mayer, vice-president of Oscar Mayer & Co., of Madison, Wis., permits two foods of separate and distinct flavors to be packed in the same can without interchange of flavors. This has been utilized in canned wieners by putting a barbecue sauce-filled Pliofilm sack into a can of wieners. Blending of two separate food flavors during the canning process is prevented. Other ready-to-eat food combinations will soon be put up this way.

The Pliofilm sack is heat sealed, after which it is air- and watertight and break-proof under normal handling conditions. Housewives can open the sack with scissors or a knife. Sauce and wieners can be heated together, or they can be heated separately and the sauce poured over the wieners.

Non-Fogging Pliofilm

A non-fogging Pliofilm for packaging fruits, vegetables and other foodstuffs has been announced by The Goodyear Tire & Rubber Co. Market tests conducted in Akron, Columbus and Pittsburgh have demonstrated that the new film not only provides superior product protection but also increases sales appeal by permitting visibility.

Heretofore, water vapor had a tendency to condense in tiny droplets inside older type films, creating a fog or film of moisture. This made transparent Pliofilm sheets appear opaque. Fog formation was accentuated by temperature changes. Holding packages in refrigerators hastened fog formation.

By the addition to Pliofilm of modifiers which act as wetting agents, moisture is dispersed in a continuous layer on the film instead of gathering as droplets (fogging). The moisture is absorbed and transmitted to the interior atmosphere, with the result that the film remains transparent.

Non-Refrigerated Container

Odorless and non-refrigerated shipments of fresh shrimp and other sea foods can now be made from remote points where air service is not scheduled. Goodyear Tire & Rubber Co., in cooperation with R. Duncan, Biloxi, Miss., has made non-refrigerated shipments with shrimp which have arrived in top quality condition after 40 hours in transit.

Shipments have been made in special containers using Pliofilm liners to avoid odors and seepage, and standard Hinde & Dauch Insulpaks. Containers are insulated top and bottom and between the sides with lightweight corrugated board. Insulpaks provide effective temperature control, and Pliofilm seals in shrimp odors and juices. Shrimp are chilled to 32 deg. F. before packing for shipment.

Insulpak shipments are cheaper than iced barrel shipments. For example, express charges for three cases of shrimp (125-lb. net) from Biloxi to Philadelphia are $4.61. An equivalent amount shipped in an iced barrel costs $6.49. Minimum 40-lb. shipments can be made by the new method.

Cellulose Acetate Boxes

The first folding, rigid transparent box, fabricated of Vuepak, a cellulose acetate material produced by Monsanto Chemical Co., has been developed by Interstate Folding Box Co., Middletown, Ohio. The box is shipped in knock-down form. Sides and bottom (or top) are of cellulose acetate, while the ends are made of cardboard to provide the box with additional rigidity.

To date, most of these boxes have been fabricated semi-automatically as set-up boxes. Consequently, use of these packages has been limited to items not requiring a large number of these boxes. In addition, because of the space required, stock has had to be held to a minimum. Now that the cost of these boxes has been reduced through machine production, and less storage space is required, it is possible to use them to package foods other than luxury items.

Plastic Packages

Use has been made of polyethylene film by Bakelite for packaging fruits, vegetables and turkeys. Products packaged in polyethylene are guaranteed to remain fresh and protected against rough handling.

Bakelite Vinylite resin coated packages are used for frozen foods. Vinylite resin coated foil packages are effectively used for prepared food mixes. Baked-on flexible can linings, made with the resin, are odorless, tasteless and resistant to water and alcohol.

Union Bag & Paper Corp. has announced an "Air-Pek" bag for packaging produce such as onions and potatoes. The bag is constructed of two-ply, wet strength kraft with open-mesh cloth in place of a cellophane window. It provides partial visibility and possesses greater carrying strength than "Pek" bags with a cellophane window. Air-Pek bags can be packed at the shipping source.

The Shellmar Products Co. has adapted a heat-sealable transparent bag for packaging olives in brine. Hayssen Mfg. Co. has an attachment on their automatic carton wrapping machine for solvent sealing Lumarith (cellulose acetate).

Wrapping Oranges

A machine has been designed and built for the Curtiss Candy Co. to stretch a thin sheet of Pliofilm around oranges. The machine represents an investment of more than $150,000 and six years' study on the part of W. S. Cloud and his staff of technicians, representatives of the Florida Citrus Exchange, film technicians of The Goodyear Tire & Rubber Co., and A. L. Stahl of the Florida Agricultural Experiment Station.

About 800 oranges can be wrapped a minute or 1,000 boxes of fruit a day. Cost, on a volume production basis, is estimated at $0.01 per orange, comparable to the cost of applying the present non-functional wrapper.

Pliofilm wrappers are used to reduce weight loss and spoilage. While it does not prevent spoilage of infected fruit, it does prevent the "nesting" or spreading of the infection to other fruit.

The machine is now in operation at the Oak Hill Cooperative Fruit Packing plant where oranges are washed, waxed, polished, sorted and graded before they are conveyed to the wrapping machine. Oranges are then carried five abreast to the top of the machine, chuted by gravity to a revolving cylinder and fed between two rolls with cups into which the oranges fall as the rolls revolve against each other.

Two sheets of Pliofilm, fed from rolls, are heat-softened by passing over heated rolls. The heated Pliofilm sheets are gripped by a series of fingers, operating on cam tracts on both sides of the machine, stretched to six times their original size and fed over the revolving cupped drums. Suction draws the film into the cups. Oranges drop into the cups and are sealed between the two sheets of film. The oranges pass to another cupped conveyor where the surplus film is trimmed by heated wires and brushed away by rapidly revolving brushes.

Package Labels

Package Machinery Company's top labeller uses Marathon thermoplastic Super Seal Labels for automatically applying heat-sealable top labels to packages. The machine is capable of operating at high speed independently or in conjunction with wrapping machines. A printing device, attached to the unit, indicates product identity, date of packing, weight, price or code.

Wrapping Irregular Items

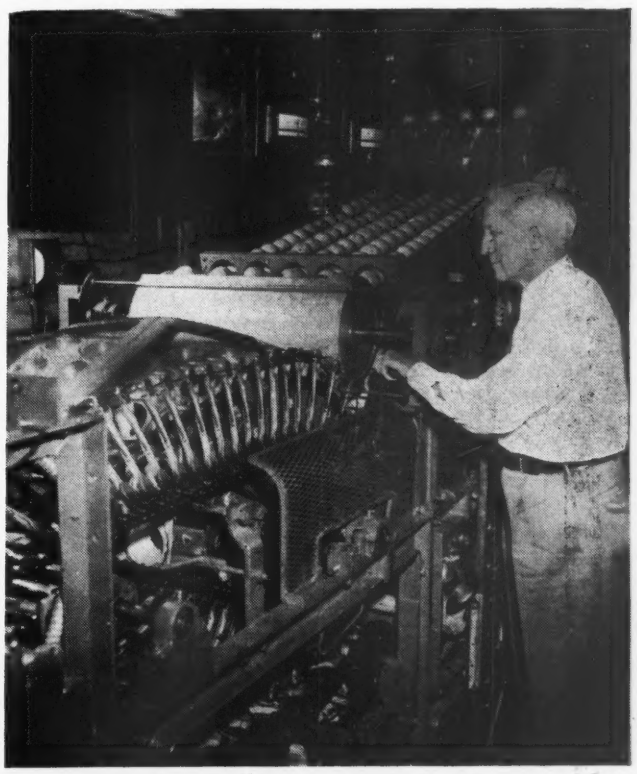
Stokes and Smith have developed a machine, called a Stretch-Paker, for wrapping a large variety of food products as large as a turkey down to the smallest items. Pliofilm is used in widths up to 16 inches. The machine, a modification of the Clunan Pliofilm packaging machine, also vacuumizes the packages. Air is withdrawn by means of pipes which project between the films about the object as it is being wrapped. If a number of items are to be wrapped simultaneously, more exhaust pipes can be used.

Weight Control

A new machine, known as the "Weightrol," is manufactured by The Fred Goat Co., Inc., to provide

(*Continued on page* 200)

The "Weightrol" provides continuous filling weight control by check weighing packages and indicating over- or under-filling.



New packaging machine wraps 800 oranges a minute in a thin sheet of Pliofilm which reduces weight loss and spoilage.

PALLETIZED HANDLING— USES AND MISUSES

Palletization, unless properly applied, may cost you more money than it saves. Handling conditions, initial investment, labor and operating costs must be studied to determine the advantages of various handling systems

By JOHN I. THOMPSON, Consulting Engineer, Washington, D. C.

PALLETIZED or unit load system of mass movement has become the "fair haired boy" of the materials handling experts. Adoption of this system has received much publicity as a result of savings in man-hours by the armed services. Its use is now being considered in every possible application. Before deciding to change over from an existing system, certain basic factors in palletized handling should be carefully scrutinized. These factors are based chiefly on cost relationships. Upon reverting to a competitive basis, economic handling is important.

Success of the unit load system employed by the Army and Navy was credited to: (1) The necessity of handling tremendous amounts of material in relatively short periods of time, (2) existence of ideal conditions for use of pallet and fork-lift trucks due to manpower shortage and (3) availability of unlimited financial resources to permit research and purchase of necessary equipment. Because of manpower shortage, the primary objective of the armed services was saving of man-hours. Saving of dollars was secondary. Saving of man-hours does not always result in a correspondingly large gross saving of dollars. In any given plant facility where the unit load system can replace another already in use, replacement is not necessarily the course to follow. This detracts in no way from the enormous advantages of palletized handling where it has been applied intelligently.

Study of an actual case will illustrate the need for advance, accurate cost analysis and will show a practical approach to similar problems. This case involved a new warehouse, planned by a packer whose production was largely seasonal. Products from several plants were consolidated in this warehouse to offer the trade mixed carloads of the widest range of different brands and products.

A quick study of investment requirements excluded methods other than the use of warehouse hand trucks or forklift - tractor - trailer-pallets. To simplify presentation, reference to costs other than those concerning handling is omitted. Similarly, a step-by-step approach, in definite sequence, necessary to arrive at the conclusions is omitted. A comparison of handlings by complete palletizing, partial palletizing and no palletizing is taken up in detail. This comparison illustrates economic advantages as well as disadvantages accomplished.

Basic data used in the study include: (1) An annual number of 6,000,000 units handled, (2) an average pallet load of 40 units, (3) an average hand truck load of 20 units, (4) a maximum of 2,000,000 units in the warehouse at one time, (5) a minimum of 1,000,000 units in the warehouse at one time and (6) an approximate total duration of storage of 21,000,000 unit - months (units stored times months per case). Other factors, such as velocity, distance, time, variations between car loading and unloading, and space occupancy can be used.

TABLE I—Initial Investment Required for Three Methods of Handling 6,000,000 Units Annually.

		Maximum palletization	Partial palletization	No palletization
Pallets	Number	50,000	25,000	.....
	Unit cost	$ 2	$ 2	.....
	Total cost	$100,000	$50,000	.....
Fork-lift trucks	Number	5	3	.....
	Unit cost	$ 2,200	$ 2,200	.....
	Total cost	$ 11,000	$ 6,600	.....
Tow tractors	Number	3	1	.....
	Unit cost	$ 1,200	$ 1,200	.....
	Total cost	$ 3,600	$ 1,200	.....
Trailers	Number	45	15	.....
	Unit cost	$ 200	$ 200	.....
	Total cost	$ 9,000	$ 3,000	.....
Hand trucks	Number	.....	10	60
	Unit cost	.....	$ 140	$ 140
	Total cost	.....	$ 1,400	$ 8,400
	Total	$123,000	$61,200	$ 8,400

TABLE II—Comparison of Labor and Operating Costs for Handling 6,000,000 Units Annually by Complete, Partial and No Palletization.

	Complete palletization	*Partial palletization	No palletization
Capital investment	$123,600	$ 61,200	$ 8,400
Labor	$ 23,400	$ 27,915	$ 50,490
Depreciation	$ 12,360	$ 6,120	$ 840
Operating & maintenance	$ 2,400	$ 1,200	.....
Total annual cost	$ 38,100	$ 35,235	$ 51,330

*5,000,000 cases handled with pallets and 1,000,000 cases handled by hand.

Initial Investment

From the basic data, it is evident that 50,000 pallets are needed if all material is to be palletized at all times. It is further evident that a substantial amount of material must be held for the greater part of the year. This makes it possible to divide the material between those held longest in bulk stocks from those that are moved out of

the warehouse quickly on pallets. Unfortunately, it is impossible to arrive at a degree of palletization that will be perfect economically due to variables, such as fluctuations in sales and production.

A comparison of the initial investment required to handle material in a warehouse by complete palletization, partial palletization and no palletization is given in Table I. These figures show that approximately 80 percent of the initial investment covers the cost of pallets where complete or partial palletization is employed. Where the fork-lift-tractor-trailer-pallet system is not used, the initial investment covering ten hand trucks, is only $8,400. This figure is 7 and 14 times greater with the partial and complete palletized systems, respectively.

Operating Costs

Double-faced pallets withstand 1,000 handlings over a ten-year period. In this case, where complete palletization is employed, the average usage of one pallet in a year is limited. For partial palletization, use of the pallet is even greater and may amount to 50 handlings per pallet in a ten-year period. In determining operating costs, a ten-year depreciation figure is taken. Other equipment is considered on the basis of depreciating in ten years. Operating and maintenance costs of mechanical equipment are estimated in accordance with the workload cited. Operating costs covering depreciation and operation and maintenance, are shown in Table II. For complete palletization, operating costs are $14,700, $7,320 and $840, respectively.

TABLE III—Cost Comparisons of Several Levels Where 500,000 Cases Are Held the Greater Part of the Year and the Remainder Are Moved Rapidly.

Total annual case handlings	Cases held greater part of year	Fortnightly turnover in cases	All on pallets	Partially on pallets	All on hand trucks
1,000,000	500,000 to maximum	.....	$11,220	.....	$ 9,255
3,000,000	500,000 to 1,000,000	67,500	$26,400	$21,278	$26,135
6,000,000	500,000 to 1,000,000	125,000	$38,100	$35,235	$51,330

Labor Costs

Labor costs are best obtained from "man-hours required per unit handled." Time studies must be made under ideal conditions. Accurate studies, made under ideal conditions, aid in bettering the efficiency of the operations without merely speeding them.

For the case being cited, the following man-hour units apply: (1) Time per unit when moved by warehouse truck equals 0.0099 man-hours and (2) time per unit when moved by pallets equals 0.0039 man-hours. Such times include palletization and depalletization, truck loading and unloading and an average of hauls encountered.

Average labor rates are $0.85 per hour for un-mechanized warehousing and $1.00 per hour for the mechanized. Labor costs for 6,000,000 unit-handlings by complete palletization and no palletization amount to $23,400 and $50,490, respectively. Where 1,000,000 unit-handlings are accomplished by hand and 5,000,000 are handled on pallets, labor costs under the partial palletization system are $27,915.

A comparison of operating this warehouse according to the three methods is shown in Table II. These cost figures include labor, depreciation and operation and maintenance. The figures show a savings of $13,230 or about an 11 percent return by complete palletization where the capital investment was $123,600. By partial palletization, a savings of $16,230 or over a 26 percent return was obtained upon an investment of $61,200.

These figures show that where a large investment is made in pallets, true economy results only after a pallet is used at least four or five times a year. During the war, immediate need for man-hour savings did not take into account the cost of pallets. This resulted in an anomalous case in which labor-savings were obtained without a corresponding cost reduction.

Changes in any of the above conditions, such as lower price for pallets, higher wage for labor and greater use of one pallet will change these results. Such changes would favor palletized handling. Changes in the reverse direction would not favor palletized handling.

(*Continued on page* 200)

Fig. 1. In small operations, raw materials can be carried to the line and finished products to the warehouse by a fork-lift truck at a trifle of the investment of a continuous conveyor system.

Fig. 2. Fork truck working at tiering palletized loads. These are being stacked from warehouse trailers (not shown) previously hauled to location by warehouse tractor.

Controlling the Quality Of Kraut During Manufacture

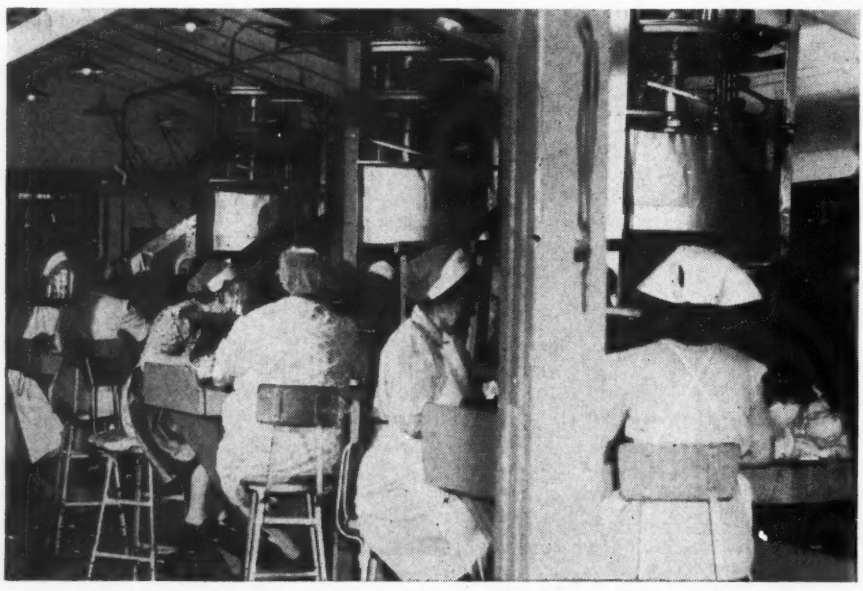
To manufacture a quality sauerkraut, proper salting, temperature control, covering of vats, cleanliness, and careful canning are necessary. Present standards, particularly with reference to the salt content, need revision

By CARL S. PEDERSON, New York State Agricultural Experiment Station
Cornell University, Geneva, N. Y.

IN this country a fairly well standardized procedure has been followed for production of kraut of a more or less definite quality. Much, however, must be learned and many improvements may be made. Superior quality is most desirable. We need to know more about factors governing quality. Even the most successful packers admit that some tanks, as well as cans, of kraut are better than others.

What do we mean by quality? What are the factors governing quality? How may we improve quality?

We might take the definition of the Federal Food and Drug Act: "The clean, sound products of characteristic flavor, obtained by full fermentation, chiefly lactic, of properly prepared and shredded cabbage in the presence of not less than two percent nor more than three percent of salt. It contains, upon completion of the fermentation not less than 1½ percent of acid expressed as lactic acid." This definition, however, does not describe the bright light-colored and snappy or crisp kraut with a pleasing acid aroma and clean acid kraut flavor. It is this quality that has made the industry as large as it is in this country. It is a contrast to the dark-colored, poor textured product with the putrid aroma that some people associate with kraut.



Cabbage heads enter the plant on a belt conveyor. Coring machine shreds the cores. Cabbage is transferred by chutes to trimmers. Belt conveyor carries cabbage to cutters.

Fermentation

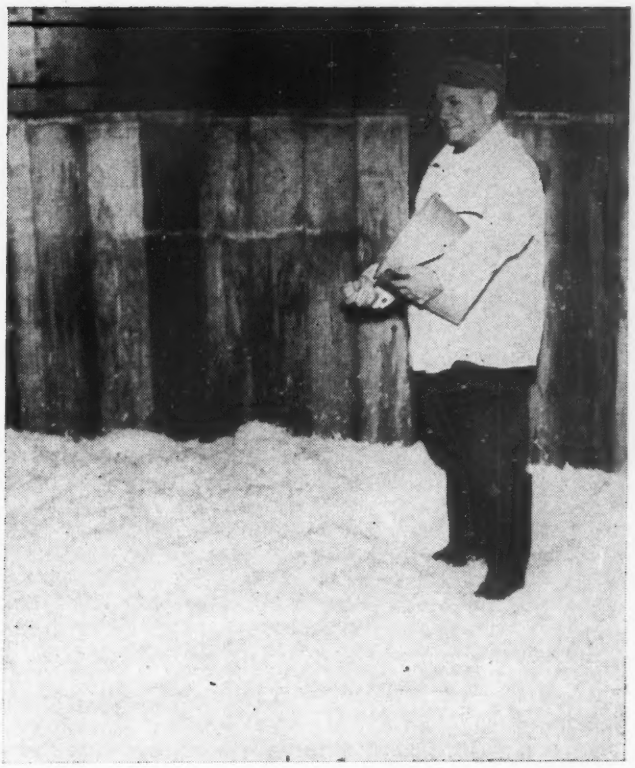
Fermentation of kraut is unique. It is carried out by three distinct types of bacteria growing in sequence, each of which has a distinct role in the fermentation. It is just as important for these bacteria to grow and develop in their proper sequence, as it is to use good cabbage rather than wild cabbage, mustard or one of the other relatives of cabbage. Any disturbance in this sequence in fermentation or fermentation by other microorganisms such as yeast is detrimental to good quality. With these facts in mind we know that the governing factors in preparation of good kraut are cleanliness, proper salting, proper temperatures so that a normal and active fermentation can take place, and proper covering of the tank. After fermentation, it is, of course, essential that the kraut be properly canned.

Role of Salt

Salt is the most important factor in controlling the nature or type of fermentation. In a recent address, Dr. Dunn compared salt to the blocking back in football, who never carries the ball and never receives the plaudits of the crowd, but is so essential to a winning team. Like the blocking back who fails to take out the right tackler, salt, if not judiciously used, does not provide proper support for bacteria essential to good fermentation.

The primary function of salt is to withdraw juices from the cabbage so as to make a brine for supporting the growth of certain desirable bacteria. In properly fermenting cabbage, undesirable bacteria and yeast find conditions unsuitable for growth and their effect is negligible. In concentrations used in kraut, salt has little effect as a preservative. The addition of a pound or more of salt to a cart of kraut to be held over has no value and is often detrimental. The pri-

Shredded cabbage is hand-trucked in carts and dumped into large fermenting vats. The cabbage is then spread evenly in the vats.



Each layer is uniformly sprinkled with salt. The salt and cabbage juices form a brine for growth of desirable bacteria.

mary preservatives of kraut are the acids, alcohol and carbon dioxide produced by fermentation. Salt has only a small but supplementary value. Any slight change in concentration of salt may be more detrimental than valuable due to its effect upon fermentation and acid production. Salt might be compared to many medicines. A little may be most valuable, a little more may be harmful, and still more may kill the patient. We might do well to have the present standards (two to three percent of salt) adjusted, since it is not the best salt concentration range for good fermentation or flavor. Several cans of kraut, made with 2¾ to 3 percent salt, were examined recently. The product was found undesirable.

Of secondary importance, salt is a supporter of flavor. Kraut, like other food products, *should not taste salty.* A well flavored kraut will have a proper balance between salt, acid and kraut in which the kraut and acid flavor are predominant and salt is not noticeable. In well fermented kraut containing 1.8 to 2.0 percent acid, salt is not noticeable up to about 2.4 percent. Higher concentrations taste either salty or salty and bitter. In canned kraut with about 1.2 percent acid, salt in excess of two percent becomes obvious. This is reason for changing present standards.

Spoilage conditions due to the wrong salt content include pink kraut, spotted kraut, soft kraut and sometimes slimy kraut. Pink kraut is usually due to too much salt. Excess salt inhibits natural bacterial fermentation, but allows fermentation by pink yeasts. Spotted kraut is often due to highly excessive amounts of salt in spots throughout the kraut. Fermentation of all types is stopped and the cabbage undergoes a physiological breakdown. Soft kraut and sometimes slimy kraut are due to too little salt and overactive fermentation by certain bacteria.

Recently, we have observed that much of the lack of uniformity in salting is not due to failure to distribute salt evenly, but rather to the effect of pressure exerted by dumping cartloads of shredded cabbage in the vat during filling. When cabbage is first salted, equalization between salt and juice is not attained, but rather the free juice contains a high concentration of salt. This free juice is forced away from the area where the cabbage is dumped by the pressure of the cabbage. Thus, an area of tightly packed kraut often has a low salt concentration and may sometimes be soft, while around the periphery of this area the kraut has a high salt concentration, and is sometimes pink. This condition can be partially corrected by the salter, if he is aware of these facts.

Two of the physical properties of salt should be mentioned. The rate of solubility is proportional to particle size. Thus, a fine salt will go into solution more rapidly than a coarse salt. Secondly, salt varies considerably in density. Dr. Dunn found that a coarse flake salt weighed 38 lb. per cu. ft., while a granulated salt weighed 75 lb. per cu. ft., or twice as much. Therefore, never measure salt by volume.

Fermentation and Temperature

Rate of fermentation, or time required for kraut to cure, is dependent upon the temperature of shredded cabbage as it is packed into the vat. Various species of microorganisms have definite growth temperature ranges. Some types grow most rapidly at about 120 deg. to 130 deg. F. We call them thermophils. Other types grow well at very low temperatures, 30 deg. to 40 deg. F. The bacterium *Leuconostoc mesenteroides,* which we find so important in the early fermentation of kraut, will grow at 45 deg. to 100 deg. F. The lactobacilli, that complete the fermentation, grow from 60 deg. to 115 deg. F. The ideal temperature, considering the known facts as well as experience, seems to be from 65 deg. to 70 deg. F.

Plenty of cabbage is cut in cold rooms and packed into tanks at temperatures well below 50 deg. F. Sometimes no attempt is made to warm the surroundings during cutting, but rather to apply plenty of heat after cabbage is packed. The

Vats must be properly covered during fermentation to prevent surface contamination or spoilage. Weights must be placed on covers which must fit the vats closely.

time to apply heat is when the cabbage is going into the vat. Sometimes, it may be beneficial to apply warm air to freshly shredded cabbage, especially in extremely cold weather.

Covering Vats

Poor aroma in kraut is usually due to vats being improperly covered during fermentation. Kraut put up by some packers never has a poor aroma, even though their kraut may have other faults. Kraut put up by other packers invariably has poor aroma, even though good in all other respects. This is definitely associated with improper covering and surface fermentations or spoilage.

Darkening of kraut after removing it from the vats is a problem. Little is known about it. Darkening was prevalent in 1921, 1928, 1933 and 1934, four of our driest summers in the past quarter century.

Darkening of Kraut

These facts seem to correlate with darkening that occurs after kraut is removed from the tank: (1) The season is poor for cabbage, (2) small loose heads are common, (3) such heads contain relatively higher numbers of aerobic bacteria, (4) some of these bacteria produce darkening in laboratory media and it might be assumed would do the same in cabbage if we had a way of proving it, (5) low temperature and slow fermentation favor the longer existence of these bacteria in the cabbage, and (6) cabbage varies considerably in the presence of certain bactericidal substances active toward the above bacteria.

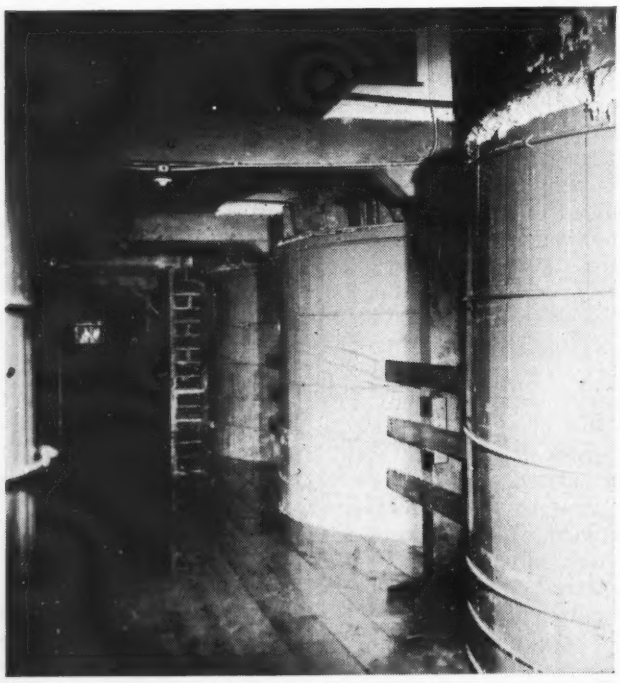
Vitamin C Retention

From a nutritive standpoint, cabbage contains about 90 percent water and some sugar, protein, and fat. In addition, it is one of the best sources of vitamin C, or ascorbic acid. Carbon dioxide produced during fermentation apparently has a protective action, and thus little ascorbic acid is lost during active fermentation. Slow losses occur afterward. These losses are apparently proportional to the temperature and loss of carbon dioxide. During canning some vitamin C is destroyed. Consequently, the ascorbic acid content of kraut is variable. Variations are due to the amount of vitamin C in cabbage and losses during storage and canning. Since ascorbic acid is a good selling point for this food, it might be advisable to consider fortification with ascorbic acid to a uniform level.

Canning Kraut

Microorganisms present in fully fermented kraut have been shown to be non-resistant to heat. It has also been found that the destruction of microorganisms is more readily accomplished in acid solutions.

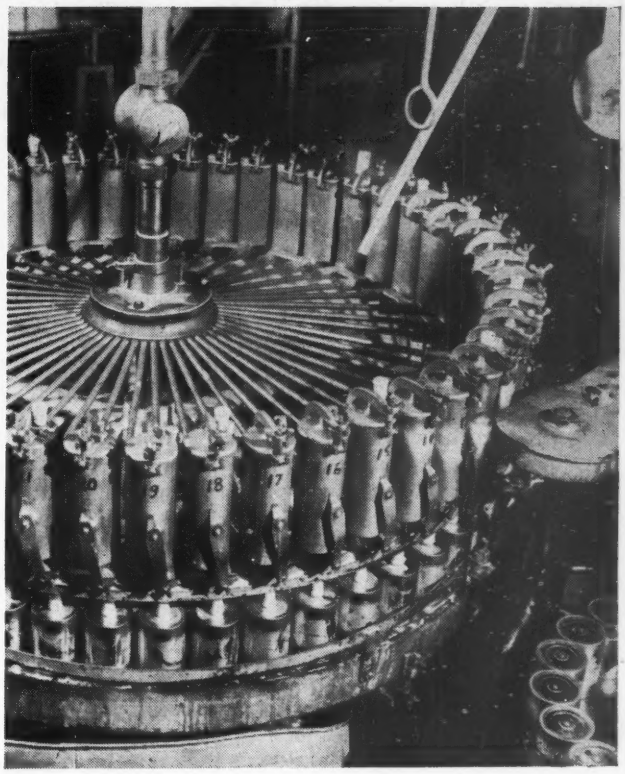
(*Continued on page* 212)



Rate of fermentation depends upon temperature of kraut packed into the vat. Ideal fermentation temperature is 65 to 70 deg. F.

Hand-packing preheated kraut into cans. Heating kraut before filling into cans is more efficient than sterilizing in cans.

Effect of Oxygen on Color And Flavor Of Heated Milk



When cans are filled with evaporated milk a certain volume of air remains in the headspace. The oxygen, in this air, is a contributing factor to the cooked flavor and brownish discoloration produced by sterilization. When this air was removed, and the headspace filled with nitrogen before sterilization, a significant improvement in both color and flavor was obtained.

Cooked flavor and discoloration of heated milk, which may be the troublesome Maillard reaction, is associated with CO_2 production and oxygen uptake. Air removal may be the answer

By N. P. TARASSUK
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THE heat treatment of milk causes an undesirable change in flavor, the extent and the kind of the defect being dependent on the temperature to which the milk is subjected and on the length of time of heating. A "heated" or "pasteurized" flavor is produced by treatment at relatively low temperatures —for example, during pasteurization at 142 to 145 deg. F for 30 minutes. This mild off-flavor is usually not objectionable to the consumer.

In the manufacture of dairy products such as evaporated milk and sterilized cream, which are processed at high temperatures to render them sterile, a "cooked," "caramelized," or "burnt" flavor is produced, with accompanying brownish discoloration of the product. Both the cooked flavor and the brown discoloration of evaporated milk are generally regarded as undesirable.

Two Theories

There are two conflicting theories regarding the cause of the brown discoloration, and presumably of the accompanying "cooked" or "caramelized" flavor in milk sterilized by heat. According to the first theory, the brown discoloration results from condensation of the reducing sugar of milk, lactose, with proteins of milk.[7, 9] This presumably would be the Maillard type of reaction of aldehyde-amino groups —the reaction to which a browning of dehydrated foods, at least in part, has been generally attributed.[6, 12]

According to the second theory, the brown discoloration is due entirely to caramelization of lactose by the casein and/or by the dissolved milk salts, especially the phosphates.[4, 5, 16] Webb[13] believes that a lactose-amino combination may account for much of the browning of autoclaved milk, with caramelization of lactose by phosphates as a contributing factor. Although the exact mechanism of the browning reaction in milk as in other food products remains obscure, the intensity of the discoloration produced is known to be influenced by certain factors—namely, the pH of milk,[9, 14] lactose concentration,[4, 9, 13] and temperature and time of heating.[9, 14]

Chemical Changes

Concerning the chemical changes related to the browning reaction, it has been shown that a portion of lactose is converted into acids.[5, 15] According to Kometiani,[5] the acids formed are lactic and formic, with the latter accounting for only 20 to 25 percent of the total lactose loss. Gould[4] found that in skim milk under prolonged heat treatment at 241 deg. F. along with formic, other volatile acids are produced, but formic acid contributed 80 to 85 percent of the total volatile acids. Kometiani[5] could not account for the increase in acidity of heated milk as entirely derived from lactose. He advanced the belief that the heat alters the casein molecule in such a way that it results in an increase in free carboxyl groups and in acidity.

Wright[16] maintains that the casein of autoclaved milk is essentially unaltered, since the racemization curves of the caseins from raw and autoclaved milks are identical. Kometiani[5] did not find any change in the amino nitrogen content of heated milk. Gould and Frantz[4] found a slight but definite increase

in the formol titration of milk subjected to a prolonged heat treatment, but the change, according to the author, does not appear to be related with browning of milk.

According to Townley and Gould,[11] there is a transition from a cooked flavor to a caramel or evaporated milk flavor as milk is heated to progressively higher temperatures. The volatile sulfides and sulfhydryl groups responsible for the cooked flavor, diminished when a caramel flavor appeared and this change was accompanied by browning.

No Known Preventive

At present no effective method for preventing brown discoloration and cooked or caramelized flavor of sterilized milk is known. The addition of sodium bisulfite or formaldehyde[8, 13] will reduce or prevent entirely the development of brown color; but, obviously, this method cannot be used with a commercial food product such as evaporated milk. In the case of fruit products, such as dried apricots, it has been shown[10] that the rate of darkening in storage can be decreased materially by packing in vacuum. Joslyn[3] regards that a primary reaction in browning of fruit products is absorption of oxygen, followed by complicated secondary reactions.

Webb,[13] working with 5 percent lactose solution containing phosphate buffer, observed how heating and storage affected the brown discoloration when the lactose solution was sealed in an atmosphere of different gases. He found only slight differences in the color of lactose solution heated in air, nitrogen, oxygen, carbon dioxide, or a vacuum. During storage, however, these differences in color were intensified. According to Webb, "Evidently the development of color during storage either required, or is markedly increased by, the presence of oxygen." Webb did not study the change in composition of gases in relation to browning of lactose solution, nor are there any data available in the literature as to gas changes where milk is heated in a sealed container. The present preliminary study is concerned with gas changes during heating of evaporated milk, and the relation of these changes to the degree of browning and heated flavor of the product.

Experimental

Evaporated milk, processed under standard commercial conditions and filled in cans that contained 13½ ounces* by weight, was taken from the line in an evaporated milk plant after the cans had been sealed but before they were sterilized. They were divided into ten lots, and each lot was heated in a pilot sterilizer at the temperature and time shown in Table I. The samples were cooled in the pilot sterilizer and stored at 41 deg. F. Within 48 hours after the heat treatment, the concentration of carbon dioxide and oxygen in the free space of the can was determined. Before a gas sample was taken, the cans were warmed in a water bath at 68 deg. F. Gas analysis was made according to the procedure of Peters and Van Slyke[9] with Haldane gas apparatus. The cans were then opened; and the samples scored by experienced judges, for flavor and for intensity of brown discoloration. Table 1 presents the results.

*These were government cans for overseas shipment. A standard can is filled to contain 14½ ounces.

TABLE I—Relation of Intensity of Cooked Flavor and Degree of Discoloration of Evaporated Milk to Percent of Carbon Dioxide and Oxygen Found in the Free Space of Can After Various Heat Treatments.

Sample No.	Temperature of Heating, deg. F.	Time of Heating Minutes	Percent CO_2	Percent O_2	Intensity of Cooked Flavor*	Degree of Discoloration*
1	Control	0	0.06	20.89	0	0
2	186	5	0.32	18.54	1	1
3	213	5	0.39	17.85	2	1½
4	238	5	0.76	15.75	3	2
5	244	5	1.09	13.80	3½	2½
6	248.5	5	1.32	12.38	4	3½
7	168	20	0.30	17.90	1	1
8	187	20	0.35	17.85	2	1½
9	213	20	0.64	16.26	3	2
10	238	20	1.63	8.69	6½	5½
11	244	30	2.24	6.30	7	7

*Increasing numbers denote increase in cooked flavor and discoloration.

TABLE II—Uptake of Oxygen and Production of Carbon Dioxide in Evaporated Milk During Storage.

Sample No.	Temperature of Sterilization, deg. F.	Time of Sterilization, Minutes	Storage Time at Room Temperature 24 hr. percent CO_2	24 hr. percent O_2	5 months percent CO_2	5 months percent O_2	8 months percent CO_2	8 months percent O_2
1	244	15	1.24	12.92	...	...	2.26	4.64
2	245	15	1.35	11.15	1.96	2.65	...	...
3	Unknown	Unknown	3.44	6.16	4.39	3.80	...	...

TABLE III—Improvement of Flavor and Color of Evaporated Milk by Lowering the Oxygen Content in the Free Space in the Can.

Sample No.	Treatment	Before Sterilization Percent CO_2	Before Sterilization Percent O_2	After Sterilization Percent CO_2	After Sterilization Percent O_2	Flavor	Color
1	Control	0.06	20.91	1.35	11.15	4	4
2	Treated	0.02	4.24	0.89	1.76	2½	3
3	Control	...	...	...	...	4	5
4	Treated	...	...	...	...	2	3

Carbon Dioxide Production

From the data in Table I, on the change of gases in the free space in the can, it is evident that the chemical changes brought about by heating are in uptake of oxygen, and production of carbon dioxide by a heat-labile constituent or constituents of milk. The increase in carbon dioxide as found cannot possibly be explained by a decrease in oxygen, which would account for only a negligible increase in percent of carbon dioxide. Neither can the increase in carbon dioxide, in the free space of the can, be attributed to the effect of heating on the carbon dioxide soluble in milk. The samples were cooled to the temperature at which they were sealed, and they stood in the cold at least 12 hours before gas analysis was made. Considering that the free space in the can was the same (48 c.c.) for all samples in this experiment, the data reveal a close relation among the carbon dioxide produced, the oxygen used, the intensity of cooked flavor and the degree of discoloration caused in milk by heating. Figs. 1 to 4 illustrate the changes in carbon dioxide, oxygen, relative color and flavor of milk with respect to temperature and time of heating. The correlation between carbon dioxide increase and the color and flavor changes suggests that the carbon dioxide is produced in the reactions causing brown discoloration and cooked flavor.

Lower Temperature

As is general knowledge within the evaporated milk industry, the sterilizing of milk at a lower temperature for a longer time affects the color and flavor of the product more than the sterilizing at a higher temperature for a shorter

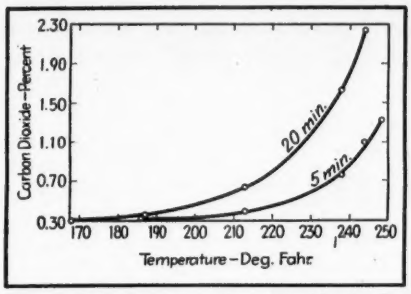


Fig. 1. Relation of carbon dioxide in free space in can of evaporated milk to time and temperature of heating.

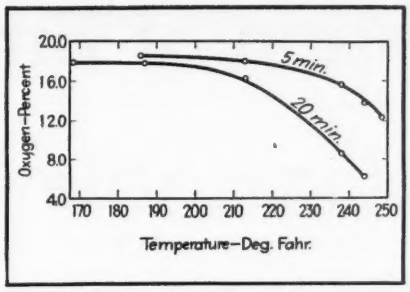


Fig. 2. Relation of oxygen in free space in can of evaporated milk to time and temperature of heating.

time. The changes in carbon dioxide produced, oxygen used at various temperatures, and time of heating bear out this observation. For instance, (see Figs. 1 and 2), when a sample was heated at 213 deg. F for 20 minutes, nearly the same amount of oxygen was used and carbon dioxide produced in the reaction as when heating was at 238 deg. F. for 5 minutes.

The correlation between carbon dioxide produced, oxygen used, and the color and flavor changes in evaporated milk exists not only as these changes are brought about by sterilization, but also as they take place during storage. As Webb[14] has shown, brown discoloration takes place not only during sterilization, but proceeds (at a slow rate) during storage. The changes in gases, as found in the free space in cans of evaporated milk during storage, are shown in Table II.

Oxygen Uptake

The uptake of oxygen and the production of carbon dioxide in the browning of milk by heat are greater than has been indicated in this work: the solubilities of gases change because of the change in the partial pressures of these gases in the free space. More carbon dioxide and less oxygen will be dissolved after milk has been heated; and, therefore, more carbon dioxide is produced and more oxygen is used in the browning reaction than is shown by the gas analysis of a sample taken from the free space in the can. In the present studies, no attempt has thus far been made to arrive at the ratio of CO_2 produced/O_2 used, since the data on solubility of these gases in evaporated milk are not available.

The ratio of carbon dioxide produced to oxygen used, based on the changes of these gases in the free space in the can, averaged 0.12 when evaporated milk was sterilized at 244 deg. F. for 15 minutes. The ratio was only 0.09 when the same milk was heated at 186 deg. F. for 5 minutes. Judging from preliminary data, and considering solubility of the gases, this ratio is much closer to unity than the free-space gas data would indicate. In browning of pure moist lactose by heating at 212 deg. F. in a closed container, the average CO_2 produced/O_2 used was 0.66. Undoubtedly, lactose is the principal source of the carbon dioxide produced in the browning of milk by heat.

Improvement in Flavor and Color

If the intensity of cooked flavor and the degree of discoloration produced by heating, are the function of the carbon dioxide produced and the oxygen used, as the data in Table I indicate, then the extent of browning milk by sterilization, together with the corresponding cooked flavor, should depend on the oxygen in the cans. The oxygen available in a sealed can is the oxygen of the atmosphere in the free space in the can, and the oxygen dissolved in the milk. A significant improvement in the flavor and color of evaporated milk was obtained, as shown in Table III, when, before sterilization, the oxygen of the atmosphere of the can was lowered by evacuation and the free space filled with nitrogen. The control, and the treated cans of milk, (Samples No. 1 and 3), were sterilized in a commercial plant at 242 to 243 deg. F. for 15 minutes. As the numerical scores of flavor and color indicate, the treated evaporated milk was definitely better in flavor and color. The cooked flavor was only mild, as compared with a strong cooked flavor of the control sample. In other experiments, still greater improvement in the flavor and color was obtained when some of the oxygen dissolved in milk was removed, and the oxygen in the space in the can was lowered to 0.69 percent before sterilization. A patent for the improvement in flavor and color of evaporated milk, based on the findings presented here, has been applied for.**

Summary

In the reactions causing brown discoloration and cooked flavor of milk by heat, oxygen is taken up and carbon dioxide is produced. A correlation exists between the carbon dioxide produced, the oxygen used, the intensity of the cooked flavor and degree of brown discoloration found in the milk after heating. The data suggest a possibility of improving the flavor and color of evaporated milk by lowering the oxygen available in a can before sterilizing the milk.

References

1. I. A. Gould, *Journal of Dairy Science*, 28, 379, 1945.
2. I. A. Gould and R. S. Frantz, *Journal of Dairy Science*, 28, 387, 1945.
3. M. A. Joslyn, *Industrial and Engineering Chemistry*, 33, 308, 1941.
4. J. P. Kass and L. S. Palmer, *Industrial and Engineering Chemistry*, 32, 1360, 1940.
5. P. A. Kometiani, *Milchw., Forsch.*, 12, 433, 1931.
6. H. S. Olcott and H. J. Dutton, *Industrial and Engineering Chemistry*, 37, 1119, 1945.
7. S. Orla-Jensen and E. Plattner, *Rev. gen. Lait*, 4, 361, 388, 419, 1905.
8. J. P. Peters and D. D. Van Slyke, "Quantitative Clinical Chemistry," vol. II. Williams & Wilkins, Baltimore, Md., 1931.
9. R. J. Ramsey, P. H. Tracy and H. A. Ruehe, *Journal of Dairy Science*, 16, 17, 1933.
10. E. R. Stadtman, H. A. Barker, V. Haas, E. M. Mrak and G. MacKinney, *Industrial and Engineering Chemistry*, 38, 324, 1946.
11. R. C. Townley and I. A. Gould, *Journal of Dairy Science*, 26, 689, 1943.
12. C. A. Weast and G. MacKinney, *Industrial and Engineering Chemistry*, 33, 1408, 1941.
13. B. H. Webb, *Journal of Dairy Science*, 18, 81, 1935.
14. B. H. Webb and G. E. Holm, *Journal of Dairy Science*, 13, 25, 1930.
15. E. O. Whittier and A. Benton, *Journal of Dairy Science*, 10, 126, 1927.
16. N. C. Wright, *Biochemical Journal*, 18, 247, 1924.

**U. S. Patent (Pending) Serial No. 659,163. April 2, 1946.

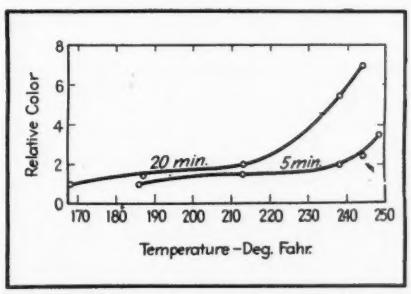


Fig. 3. Relation of brown discoloration produced to time and temperature of heating.

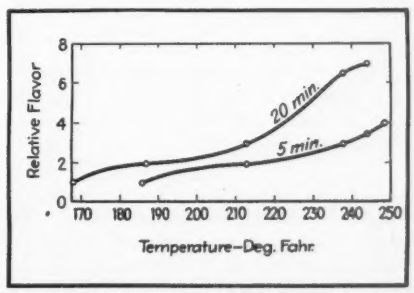


Fig. 4. Relation of cooked flavor to time and temperature of heating.

Stabilization of Emulsions With Vegetable Gums

Citrus emulsions can be made with a mixture of gum arabic and gum karaya, but a preservative is needed to prevent mold growth. Used alone, tragacanth has proven the best of the three vegetable gums

By CHARLES M. FERRI, Thurston & Braidich, New York City

THE question has often been asked as to which of the three vegetable gums, tragacanth, arabic, or karaya, or what combination of these gums, gives the most stable bakers' citrus-oil emulsions. To answer this question a series of experiments was conducted to determine the properties and stability of a lemon oil emulsion when prepared with gum tragacanth, gum karaya, or gum arabic, and combinations of these gums as emulsifying agents. In addition to stability, tests were undertaken to determine pH, viscosity and mold growth of the emulsions when prepared with different gums or a combination of gums.

Formulations for all emulsions were kept constant, with the exception of the type and amount of gum or gums used. Emulsions included lemon oil, gum, glycerine, water and coloring matter. Table I gives the formulation of various emulsions, based on an approximate yield of one gallon of finished product. Figures are in fluid ounces with the exception of gum content, which is measured in avoirdupois ounces.

Emulsions were prepared by dispersing the gum or gums in the lemon oil with a Palo-Meyer stirrer. Water, glycerine and coloring matter mixture were then added and stirring was continued for 10 to 15 minutes. The emulsions were then passed through a semi-industrial homogenizer and bottled. The homogenizer, manufactured by Colloid Equipment Co., is gravity-fed, and handles citrus emulsions varying from ½ to 5 gal., at the rate of ½ gal. in eight minutes.

The pH of the various emulsions after preparation are given in Table II. Measurements were conducted with a glass electrode pH meter at 25 deg. C. The pH values correspond closely to the pH figures of the gum solutions themselves. Emulsion H was prepared to determine the validity of the supposed statement that gum tragacanth gives its most stable emulsions at a pH of 2 to 3. Part of the water was replaced with 20 percent citric acid solution to decrease the pH to 2.1. The pH values did not change with emulsions after several months, even for emulsions which showed separation of oil and water.

The pH of the emulsions is a characteristic of the gum or gums used. Emulsions prepared with gum tragacanth alone show a pH between 5.4 to 5.7. Gum karaya emulsions have a pH of 4.4 to 4.6. Gum arabic emulsions have a pH of approximately 4.5. Emulsions containing gum tragacanth and gum

TABLE I—Formulation of Emulsions Using Various Vegetable Gums.

Ingredients	A	B	C	D	E	F	G	H
Lemon oil, U S P (medium grade)	8	8	8	8	8	8	8	8
Gum tragacanth (powdered, top grade)	3	..	..	3	3	..	..	3
Gum karaya (powdered, top grade)	..	3	..	..	..	3	3	..
Gum arabic (powdered)	..	..	8	3	6	3	6	..
Glycerine	7	7	7	7	7	7	7	7
Water	113	113	113	113	113	113	113	89
Coloring matter	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.
Citric acid, 20 percent	..	..	..	..	..	..	..	24

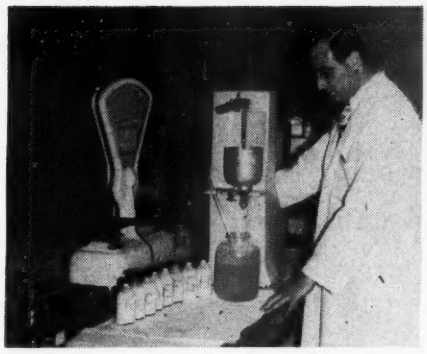
TABLE II—pH Values of Emulsions After Preparation.

Emulsion	pH
A	5.6
B	4.5
C	4.5
D	5.1
E	4.6
F	4.3
G	4.4
H	2.1

TABLE III—Changes in Emulsion Characteristics During Storage.

Period of storage	Emulsion A	B	C	D	E	F	G	H
Viscosity* ..	185	44	Too thin	100	40	36	20	100
1 Week	OK	OK	Foamy; OK	OK	OK	OK	OK	OK
3 Weeks	OK	OK	Foamy; OK	OK	Separation	OK	OK	Separation
5 Weeks	OK	OK	Separation	Separation; moldy	.....	OK	OK	.....
2 Months	OK	OK	.....	.....	.....	Slightly moldy; stability OK	Creaming; slight break	.....
3½ Months	OK	Slight creaming	.....	.....	.....	Slightly moldy; stability OK	Separation	.....
5 Months	OK	Slight creaming	.....	.....	.....	Slightly moldy; stability OK	.....	.....

*Viscosity expressed in seconds and measured with Stormer Viscosimeter, using 250 g. weight at 25 deg. C.



Bakers' citrus emulsions, containing a mixture of gums or gums alone, are passed through a semi-industrial, gravity-fed homogenizer at the rate of ½ gal. in eight minutes.

arabic show a decreased pH, depending on the amount of gum arabic used. Equal parts of gum tragacanth and gum arabic reduce the pH of a gum tragacanth emulsion to 5.1. Two parts of gum arabic to one part of gum tragacanth give a pH of 4.6. Mixtures of gum karaya and gum arabic show slight changes in pH as compared to either one when used alone.

The emulsion prepared with gum tragacanth alone gave the most stable emulsion with no signs of breaking or mold growth after more than five months' aging.

When gum arabic is incorporated in the gum tragacanth emulsion, the following changes were noted: (1) Viscosity of the finished emulsion was greatly decreased. (2) Stability of the emulsion was affected. (The higher the proportion of gum arabic used, the quicker the separation.) (3) Mold growth occured after one month, use of gum arabic in emulsions requires a larger concentration of glycerine or some other preservative.

The use of gum karaya alone in place of gum tragacanth gives a fairly stable and non-molding emulsion with but slight creaming after three months' standing. The emulsion does not flow as smoothly as the gum tragacanth emulsion.

Gum arabic-karaya mixtures are better suited than gum arabic-tragacanth mixtures for the preparation of bakers' citrus-oil emulsions. Although the viscosity of the gum karaya emulsion is decreased by the use of gum arabic, the stability of an emulsion with equal parts of gums karaya and arabic is better than one prepared with gum karaya alone. Mold growth can be prevented by increasing the glycerine content of the emulsion, substituting a larger amount of propylene glycol for glycerine, or using 0.1 percent sodium benzoate, making necessary label declarations.

Fresh Fruit Essences Available For Use as Flavoring Material

Many manufacturers are working with the process, developed originally by USDA for apple essence

INCREASING commercial interest in the fruit "essence" process is evident in a recent survey, which has revealed that a number of food processors are experimenting with "essence" production. A number of others are negotiating for equipment. At least one manufacturer is now offering essences for sale.

The basic process was developed by chemists and engineers at the Eastern Regional Research Laboratory, USDA, Philadelphia, where operations were carried through the pilot plant stage. The method was devised originally for capturing apple "essence"—the volatile substance that gives a fresh apple its fine bouquet. The USDA process involves condensing the vapors that are evolved from apple juice during heating, concentrating them from 10 to 150 fold and dissolving in water. The resulting liquid holds its flavor indefinitely without weakening or changing, thus making it possible for manufacturers of apple products to restore and intensify the flavor of fresh apple previously lost. The liquid itself is delectable.

Only sound apples can be used in the process because off-flavors from imperfections in the fruit are recovered in the essence. Small, misshapen or surplus fruits can be used, however. Since most of the volatile flavor is located just under the skin, care must be taken to damage this part as little as possible when grating or crushing the fruit for juice. Care must also be taken not to break the seeds as they give the essence a bitter almond flavor.

The process is now being applied to the isolation of volatile constituents comprising the essential flavor and aroma of many fruits other than apples. One of the companies actively engaged in the development is H. Baron & Co., Linden, N. J., food specialty house. The Baron company now has available for general use the flavors of peach, grape, blackberry, strawberry, pineapple, apricot and sour cherry. These flavors have been successfully concentrated to from 10 to 27 times natural strength.

With the process in a stage where retention of natural flavor is assured, attention is now being focussed on developing new applications for the "essences." The Baron company is inviting manufacturers and processors to submit fruit flavoring problems that may be solved by proper use of the new essence concentrates.

In the Canadian field, four independent companies are offering fruit essence for sale, although it is understood that efforts have been concentrated on apple essence in Canada. R. B. Willson, Inc., New York, is sales agent for the essences made by the Jordan Wine Co., St. Catharines, Ontario.

Some 18 other companies are listed as being engaged in essence production, although these are believed to be manufacturing for their own use. Other companies, to a total of 40, are planning to install essence recovery equipment.

Although the essence flavors can be incorporated in many types of products, there are some limitations on the uses of the new materials. As with essential oils used in perfumes, the essences are not recommended for use in conjunction with heat processing. Reason is the high volatility of the flavor compounds, a combination of esters, aldehydes and other volatiles.

The essences are being used in ices, sherbets, jelly, candy, pharmaceuticals and are being employed as bait attractant. A special formula for full-flavor apple jelly has been worked out by the USDA Eastern Regional Research Laboratory. The method follows:

FULL-FLAVOR APPLE JELLY

Preparation

1. Weigh out 330 g. conc. 78.3 Brix depectinized apple juice.
2. Add 1260 g. water.
3. Agitate and heat to about 86° F.
4. Add 9.72 g. pectin (Certo E2745—250 grade) and 100 g. sugar.
5. Add 2500 g. sugar.
6. Boil to 4160 g.
7. Remove scum.
8. Add 90 ml. citric acid solution (1 mole solution—21%) and 14 ml. apple essence (140-fold)—agitate.
9. Pour into sterilized containers—seal immediately.

Flying Perishables to Market

Customers receive better quality produce when it is shipped by air since speed makes it possible for harvesting to be delayed until actual ripening. Bigger and faster cargo planes are being built and ton-mile costs reduced

By JOSEPH L. NICHOLSON, Consulting Economist, Haddonfield, N. J.

PROPHETS of transportation of perishable foods by air see helicopters shuttling the catch of fishing boats to cargo planes. They see the wholesale produce markets of the future located at airports. But for every prophet there is a counter prophet. He is among those who have tried air transportation and say "it is going to be tough to fly produce" or "the flying of perishable foods by air is only a novelty business."

Actually the flying of perishable foods has been in the nature of a novelty business for about 20 years. During the twenties several attempts were made to build up businesses flying sea foods. Again in 1931, the Western Pacific Air Freighters started operation with a Ford tri-motor plane between San Francisco, Seattle, Boise and Reno to carry poultry, dairy products and produce at rail express rates. The venture was soon discontinued as unprofitable.

Following the inauguration of air express shipments on the scheduled airlines during the latter 1920's, shipments of foods, mostly of an Epicurean nature, have increased until they now represent about two percent of the shipments and approximately one percent of the weight. Beginning with an experimental shipment of a plane load of spinach in 1944, interest has steadily increased among growers, distributors and plane operators in the transportation of fresh fruits, vegetables and sea foods.

Potential of Air Shipments

What is the potential business in air-borne transportation of fresh fruits and vegetables? Spencer A. Larsen of Wayne University, under a grant of Edward S. Evans for air cargo research, has estimated in his 1944 study, "Air Cargo Potential in Fresh Fruits and Vegetables," the potential in thousands of ton-miles.

At 15 cents a ton-mile, he estimated that 0.15 percent of the fresh fruit and vegetables traveling over 250 miles to metropolitan centers will be carried by air. At 10 cents, 0.39 percent will be carried; at 7 cents, 6 percent and at 3 cents, 25 percent.

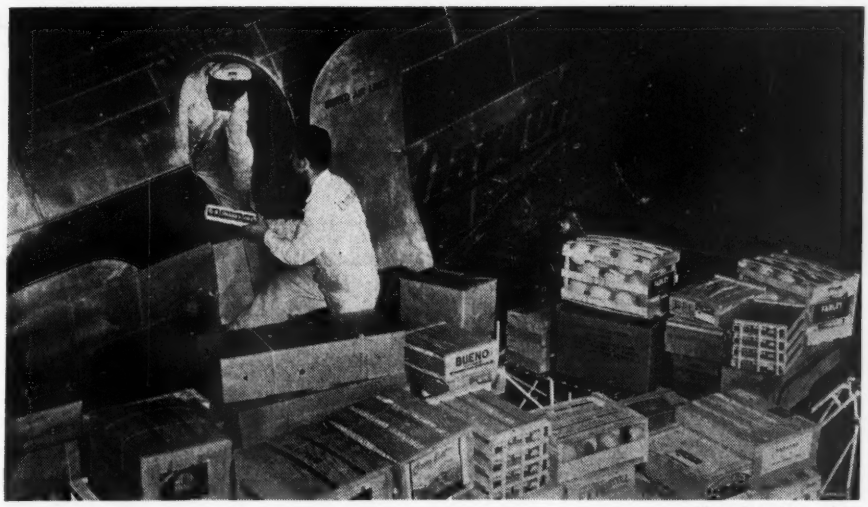
Even though only 0.15 percent of the traffic would be carried by air at 15 cents a ton-mile, it is still a lot of business for the airlines. It represents nearly ten percent more than all the express and cargo traffic generated by the domestic airlines in 1945.

Rates for air cargo, in a number of instances, have been quoted at 15 cents a ton-mile and even lower. For air express the rates are 61 cents a ton-mile. Until the advent of the contract carrier or nonscheduled operator, usually an organization of veterans, the lowest cargo rate of the airlines was 26 cents a ton-mile. For a time in the spring of 1946, when so many ex-pilots were starting in business carrying cargo, several shippers reported being quoted a rate of 10 cents. As a consequence of the rate cutting none of the contract carriers seems to have operated at a profit. Most of them had substantial losses and some operators went out of business.

Part of the trouble is in the flying equipment. H. Roy Penzell, president of Air Cargo Transport Corp., stated in September that at 20 cents a ton-mile, "with equipment which is utilized today by most of the carriers—the C-47 or C-54—and air cargo companies operating ten planes would show a

Thermostatically controlled heaters protect perishables from cold at high altitudes. On stop-overs ground heaters heat cargo.

Fresh strawberries are flown north from Texas to out-of-season markets. By air freight farmers can ship many varieties of fruits, vegetables and other perishables to every part of the country. Spoilage waste and expense of ripening can often be reduced.



United Air Lines photo

Growers can benefit from air shipments. Because of the speed of air freight, markets can be opened up a week ahead of time, particularly with coast-to-coast shipments.

Full plane loads of fresh, shucked oysters are flown from Maryland to Chicago.

profit with a daily utilization of between 4½ to 5 hours.

Robert W. Prescott, president of the National Skyway Freight Corp., recently said that when the "DC-4's (C-54's) come into common use in about a year's time, the 10 cent per ton-mile rate will be more or less standard." American Airlines have already started a contract carrier subsidiary using C-54's and have announced a rate of 11 cents for coast to coast planeload shipments.

The more perishable a product, the more likelihood of its moving by air. S. A. Larsen in his study found that at 15 cents a ton-mile, the principal commodities generating more than a million ton-miles would be strawberries and tomatoes. At 10 cents, peaches and beans would also become important. At 5 cents a ton-mile, there is no opportunity to fly carrots, onions, sweet potatoes, bananas, cranberries, and citrus fruits. Even at 3 cents a ton-mile, no movement is indicated for apples, turnips or potatoes.

Air Shipment Advantages

There are numerous advantages in shipping by air. The consumer benefits by improved flavor of tree- and vine-ripened products. Vitamin content is higher. Greater variety of out-of-season fruits and vegetables are available. Where quarantine regulations permit, many of the more perishable, tropical and semi-tropical fruits, such as papayas, sapodillas, chayotes and ripe figs can be made available through air shipments.

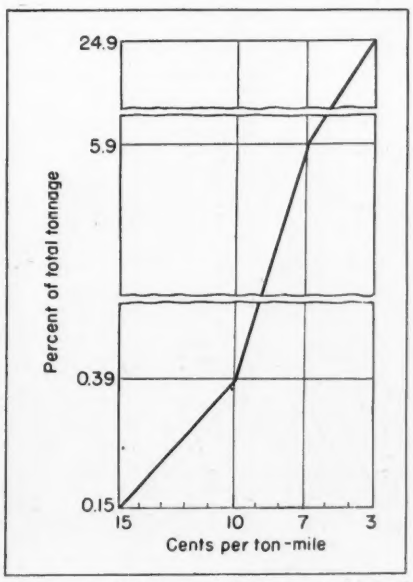
Growers benefit from air shipments, because their markets can be opened up more than a week in advance. For example, the first melons picked in California and shipped by plane would arrive on the East Coast more than a week ahead of those shipped on the same day by train. Every day until the train arrives, planes can fly melons in, thus extending the length of time of the market.

Growers can also ship perishable products to more distant markets, as strawberries from coast to coast. Crops too ripe for rail shipments can still be carried by air. Another advantage to the grower is the help in avoiding a glut market. With shipments by rail, markets must be predicted about a week in advance. These predictions at best are only guesses. Air freight, by permitting day to day predictions, can reduce bad guesses and help to stabilize a market.

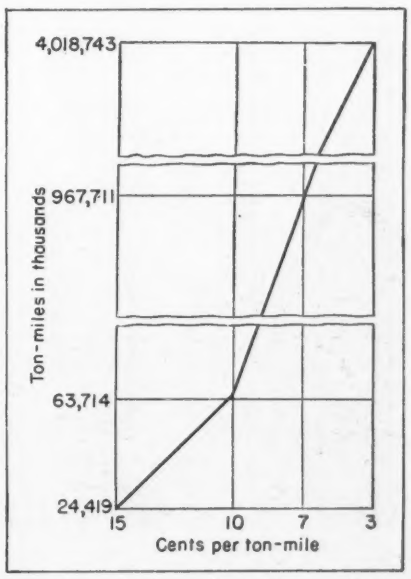
Certain distribution costs can be lowered. The customary icing, as in the case of rail shipments, is eliminated. More direct marketing is also possible. Growers may contract directly with stores or hotels. Jobbers in small cities will not be required to buy through receivers of car lots in large cities but can buy direct without the necessity of trans-shipments. This offers an opportunity for improving a condition where about 85 percent of our produce goes to 26 markets. Spoilage in transit can be reduced, and ripening costs, in the case of tomatoes, can be eliminated.

Air Shipment Problems

While there are advantages to air shipment, serious handicaps must be overcome before it is used on a large scale. Cost of air-borne foods to the consumer is a serious obstacle. It is difficult to see mass distribution of plane-carried produce as long as premium prices have to be paid. With the fancy grocery trade, premium prices are



Thousands of ton-miles of air cargo shipped at rates of $0.03 to $0.15 per ton-mile.



Percent of fresh produce that could be hauled by air freight at lower rates.

TABLE I—Air Cargo Potential in Fresh Fruits and Vegetables.

	Air Cargo Rates			
	$0.15	$0.10	$0.07	$0.03
Total ton-mile potential (in thousands)	24,419	63,714	967,711	4,018,743
Percent of gross traffic	0.15	0.39	5.99	24.89

no deterrents for out-of-season fruits and vegetables. This, however, is a small and select market. The housewife is not immediately aware of the superiority of produce carried by air. She cannot see the higher vitamin content and is, therefore, reluctant to pay the higher price.

The grower using air freight faces a number of problems. As in other means of transportation, he is charged with the freight costs whether his produce sells or not. In the case of plane shipments the charges can easily exceed the value of the produce. Already there have been cases of plane loads of fruit bringing only a fraction of their air freight because they arrived in the New York market too late to be sold at premium prices. The grower must pre-cool the produce before it is loaded on the plane, otherwise it will deteriorate in transit. Fruit, as melons, must be picked at the right stage of ripeness. If they are picked at the customary "mature green" stage to ripen in transit, they will arrive too green. For example, a shipment of honeydews was made. The shipper erred on the side of under-maturity and they arrived in a less desirable state than if they had been sent by rail.

Problems of the Distributor

The distributor on the receiving end faces a number of difficulties. Several distributors interviewed complained that they had had to pay over $150 trucking charges when trucks were kept waiting at the airport overnight. This occurred when planes had been "weathered in" at some airport on the way. Other distributors complained that the 24-hour shipment time from grower to consumer was good publicity; actually, it took 48 hours for West Coast shipments to be in the hands of an East Coast consumer. For example, if a plane leaves California at 5 p. m., it will not arrive on the East Coast until about 19 hours later. In addition, there is a three hours' difference in time. Shipments arrive at the airport for loading at about 3 p. m. They must then be transported from the airport to the market where they will not be sold until the next day.

Most distributors pointed out that the lower the prices of perishables become, the more out of proportion are the air freight rates. East Coast prices for West Coast airborne products bear a premium of 15 to 20 cents a lb. over rail freight products. If a product sells for 65 cents a lb., it can bear the premium. If on the other hand, its price drops to 20 cents a lb., few people will pay the premium.

One commission man found that express costs twice as much per lb. as freight and arrives in half the time. On the basis of the time saved, air freight should cost not over 6½ cents to attain any worthwhile volume. Another complaint voiced by receivers was that produce could be kept iced in a refrigerator car until it was sold. A plane, on the other hand, had to be unloaded at once, since the produce would either spoil or freeze depending on the weather.

TABLE II—Comparison of Cost and Time of Coast-to-Coast Shipments by Rail, Express and Air.

Method of shipment	Approx. cost, cents per lb.	Approx. no. of days required for shipments
Freight	2	10
Rail express	4	5
Air freight	16	2

Vine-ripened and fully matured perishables cannot be leisurely unloaded on open trucks hours after arrival, hauled to a store or sidewalk, pawed over by buyers, then at some convenient time hauled to a retail store and dumped into an open bin, again to be picked over by consumers. Ripe air-borne produce must be handled specially if it is to reach the housewife in a desirable condition.

Plane Operator's Problems

The operator of cargo planes has a number of problems. He may make arrangements with a shipper to have a plane available at a specified time only to find that weather conditions have interferred with harvesting. In practically every instance, airports lack the proper facilities for efficient handling of air-borne perishables on a commercial basis.

Another difficulty from the operator's standpoint is that crop seasons are constantly shifting. If rates are prohibitive, a return cargo is essential. This means flying a triangular route. For example, if strawberries are being flown to New York from Salinas, Cal., a return load of dresses must be flown to San Francisco, and the plane would proceed empty to Salinas.

Much is being done to prevent deterioration of quality in transit. Several of the operators have installed blowers for circulating air chilled by dry ice. United Air Lines has a plane in which mechanical refrigeration and heating equipment have been installed to take care of wide temperature variations that produce may be exposed to on a trans-continental flight. A plane might stop 30 minutes to refuel in Arizona where temperatures are above 90 deg. F., while temperatures below freezing may be

Fresh grapes have been flown overnight from Imperial Valley, California, to Indianapolis, Indiana, and Columbus, Ohio. Cargo was flown in temperature controlled planes.

encountered on its remaining eastward flight and stops.

To overcome the needs for refrigeration, much experimental work is being conducted by chilling the plane and its cargo during loading. This is particularly true in the case of packaged products. Oysters from the Eastern Shore of Maryland have been shucked and packed in Pliofilm bags, chilled to 32 deg. F., put in insulated corrugated boxes and then shipped to Cleveland. Shrimp are being shipped in the same way from the Gulf of Mexico to Chicago and Detroit. It is claimed that the temperature rise is about seven-tenths of a degree an hour when the outside temperature is 70 deg. F. It is also reported that when these operations are conducted on a large scale, the price to the consumer will be lower than that of the conventionally shipped product.

Progress made in air transportation will be largely dependent on prepackaging at grower level. Air cargo must be highly concentrated because weight and space in relation to cost is high. For air transportation to succeed, the tons of "garbage"—the excess of untrimmed, or unhulled perishables—must be eliminated. Prepackaging for air cargo will result in growers developing brands of their own and more direct selling.

A flight engineer regularly checks temperatures aboard refrigerated airfreighters to prevent possible spoilage. Refrigeration units maintain proper temperatures.

Use of air freight for perishable foods will be no threat to the existing methods of transportation in the foreseeable future. Much effort and money, however, are being spent on experiments to develop air freight shipments of perishables. People interested in the possibilities of air freight are not going to wait until some manufacturer develops a plane capable of carrying cargo at a rate of five cents a mile.

TABLE III—Fruits and Vegetables Listed in Their Importance as Potential Air Cargo at Varying Rates.*

$0.15	$0.10	$0.07	$0.05	$0.03
Fruits				
Strawberries	Strawberries Peaches	Strawberries Grapes Peaches Cantaloupes Cherries Pineapples Plums, prunes Raspberries Avocados	Strawberries Grapes Peaches Cantaloupes Pineapples Cherries Pears Avocados Honeydews Tangerines Apricots Raspberries	Bananas Grapes Cantaloupes Plums, prunes Peaches Pineapples Strawberries Cherries Oranges Grapefruit Honeydews Pears Avocados Lemons Apricots Tangerines Raspberries Fresh figs
Vegetables				
Tomatoes	Tomatoes Beans	Tomatoes Lettuce Asparagus Beans Cabbage Peas Spinach Corn Cucumbers Endive	Tomatoes Lettuce Beans Peas Celery Asparagus Cabbage Spinach Peppers Cauliflower Cucumbers Corn Endive Beets Broccoli Brussels sprouts Radishes Shallots	Lettuce Tomatoes Celery Peas Beans Cabbage Cauliflower Asparagus Spinach Peppers Cucumbers Broccoli Carrots Endive Corn Beets Onions Turnips Radishes Brussels sprouts Shallots Sweet potatoes

*Source: "Air Cargo Potential in Fresh Fruits & Vegetables," Spencer A. Larsen, initiated under the Edward S. Evans Grant for Air Cargo Research, University Press.

The Zaninovich Industries, the largest growers of table grapes, have formed their own company, the California Growers Air Express. This company is exploring the possibilities of shipping grapes by air. A DC-3 is now in operation and a DC-4 is being converted for air freight shipments.

Shipping Grapefruit Segments

Out of all these experiments, certain situations will evolve where air freight has a distinct economic advantage. An interesting development now being explored is the shipping of fresh grapefruit segments from Tampa to Cleveland, Cincinnati and Dayton. A packer of canned grapefruit prepares the segments up to the point where, instead of putting them in a can, they are packed in a tubular paraffined paper container, chilled, placed in corrugated boxes and put aboard the plane. This product is put up chiefly for hotels where the labor saved in preparing the grapefruit is said to counterbalance the cost of air freight.

The Flamingo Airlines are now carrying 50,000 lb. of prepared grapefruit a week and have a contract to haul up to 250,000 lb. a week as soon as the shipper can get sufficient containers. Applications that seem small at first are bound to serve as a wedge which will open the door to air freight even wider. In looking at this new medium of transportation, we must remember that there were many who scoffed at the transportation of freight by rail, because it was cheaper to haul by canal boat.

Semi-Trailers Speed Up Grocery Deliveries

This Tulsa wholesaler uses two trailers for each tractor, thereby losing no tractor-driver time while maintaining loading operations at full efficiency

A SWITCH from straight trucks to tractors and semi-trailers, some with two trailers for each tractor, features the delivery system of the Hale-Halsell Co., which distributes wholesale groceries within a 75 mile radius of Tulsa, Okla. The purpose of the change to tractors and trailers was to speed up deliveries by loading one semi-trailer while the other is out on the route making deliveries.

With two semi-trailers to each tractor, one of the trailers may be loaded late in the afternoon and made ready for delivery immediately upon the beginning of the next day's work period. The tractor driver merely hooks up his tractor to the loaded trailer and is off on his delivery route.

Meanwhile, the second trailer is being loaded and is ready when the tractor with its first empty trailer returns. It backs up its empty trailer to the loading platform; disconnects; hooks up to the loaded trailer and is off on its second trip of the day.

Depending upon the length of time required to cover the route and the ratio of that time to the time of loading, one tractor with two trailers may cover two or three routes in a day. This compares with the covering of only one or two routes if only one trailer is used and the tractor held idle while the trailer is being loaded.

Heavier Loads

Entirely aside from the economy of the two-trailer operation, the use of the trailer has another advantage. The tractor and trailer can pull a heavier load than the tractor itself could carry, if fitted up with its own body as a straight truck. Both of these advantages are realized in the Hale-Halsell operation. As straight trucks, the 1½-ton models used as tractors, haul from 5,000 to 6,000 lb., while the tractor-trailer load varies from 7,500 to 8,500 lb.

Occasionally still another advantage is derived from the two-trailer operation. If the second trailer load is not ready when the tractor and its first empty trailer return to the plant, it is rerouted to a public warehouse or a railroad pool car siding to pick up an incoming shipment. If the second trailer load is ready when the incoming load arrives at the plant, the tractor driver simply backs up the load to the plant platform, disconnects, hooks up to the other loaded trailer and is off on another route delivery. Meanwhile the incoming goods are unloaded to prepare the trailer for its next outgoing route load.

The 1½-ton tractor is seen here ready to pull out with one of its two semi-trailers. The other semi-trailer has been spotted at the warehouse platform, ready for the loading crew.

Greater Efficiency

Thus the two-trailer operation has another advantage in that it increases the work output of the warehouse loading crew. The latter always has a loaded trailer to unload or an empty trailer to load. And while these loading and unloading operations are being carried out, the tractor, the expensive half of the tractor-trailer unit, is always operating and idle tractor time is reduced to a minimum.

The Hale-Halsell Co. still has some straight trucks in its fleet, although the most recent purchases are the tractor and two-trailer combinations. One of these, a Dodge 1½-ton tractor and a Fruehauf semi-trailer, is shown in the accompanying illustration.

In the selection of the tractor, a COE, or cab-over-engine model, was chosen instead of the conventional type with the engine out in front under a hood. This unit gives a shorter overall length of the tractor-trailer combination. The reduced length is many times an advantage when parking or pulling in parallel to the curb to make deliveries.

The Fleet

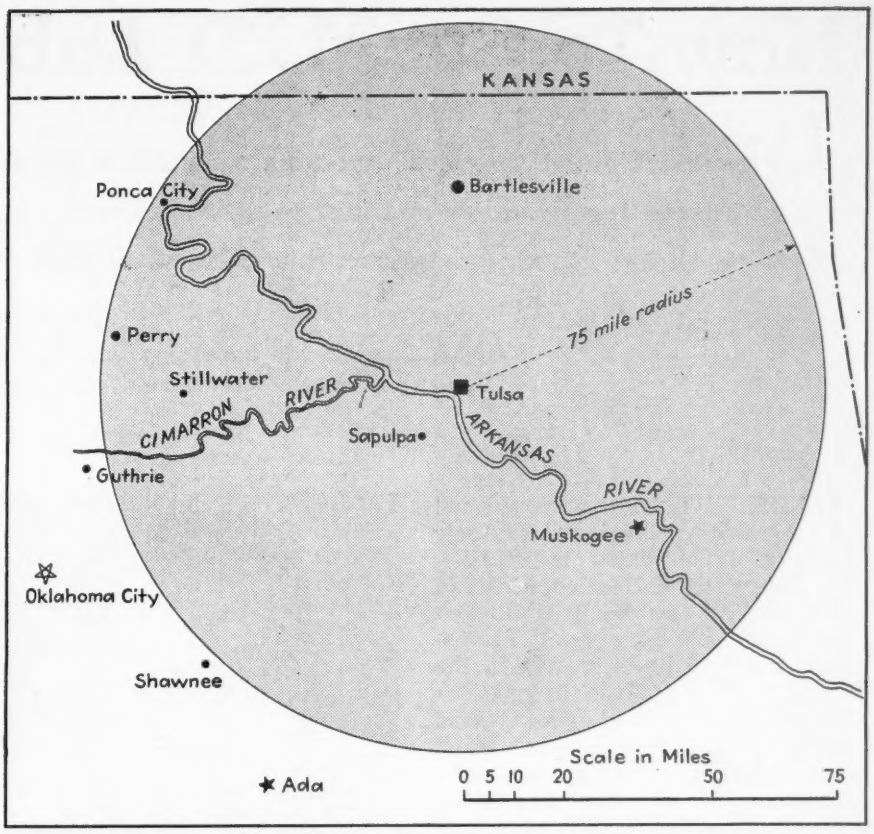
The Hale-Halsell fleet consists of nine power units and five semi-trailers. The straight trucks include two Dodge 1½-ton models, three Dodge 2-tonners and one 3-ton model. The tractors include one G.M.C. 1½-tonner, with one Fruehauf trailer, and two of the Dodge 1½-ton tractors, each with two Fruehauf trailers.

The Fruehauf trailers are of standard width, 7 ft. 6 in., with a height of 7 ft. 2 in. and a length of only 16 ft. 6 in. Since the Hale-Halsell Co. does not handle green goods such as produce or vegetables or meats, the trailer bodies are not insulated or refrigerated.

It is to be noted that the 16 ft. 6 in. semi-trailers are much shorter and carry much smaller loads than

the 20 to 25 ft. trailers. These latter carry loads of 15,000 to 20,000 lb. and are used by the big wholesale grocery chain store organizations serving densely-populated areas in the east, central west and on the Pacific coast. The smaller Hale-Halsell vehicles are used because of the area covered and type of stores served.

Tulsa has a population of about 200,000. The Hale - Halsell Co. serves independent retailers in Tulsa and in a not densely-populated area within a 75-mile radius of Tulsa. This area has few large cities as may be seen from the accompanying delivery area map.



This area delivery map of the Hale-Halsell Co. shows the principal towns included in the 75-mile delivery radius. Main warehouse is at Tulsa with branches at Muskogee and Ada.

High-Profit Items

Ordinarily wholesale groceries cannot be distributed profitably over a 75-mile radius unless there is a large percentage of high-profit items such as coffee and tea, in the loads. The Hale-Halsell loads do have this adequate percentage of high-profit items and this justifies the otherwise unprofitable 75-mile delivery radius.

The towns most remote from Tulsa such as Bartlesville, Ponca City, Perry and Stillwater are served once a week. Oklahoma City, the nearest large city to Tulsa, is not served. In order to reduce the length of some of the delivery routes, the Hale - Halsell Co. maintains branch houses in Muskogee and in Ada. Shawnee is served from the Ada branch.

The tractor-trailer combinations are used both in the city of Tulsa and on the long country runs. Deliveries are made over a 6-day week. In the city each tractor averages 22 trips a week and covers an average of 270 miles or at the rate of a little more than 12 miles per round trip.

On both city and country runs the tractor-trailer combinations are operated by one man. No helper is used such as is usually employed in large city chain store operations to help carry in the load, as a means of reducing the unit cost of delivery on the larger 15,000 to 20,000 lb. trailer loads.

Rural Area

The Hale-Halsell delivery area is essentially a rural, farming area, with a few scattered cities and towns. In each town one or more independent stores are served. The weekly sales volume of such stores is much less than that of the large city chain store super-market. This explains the relatively smaller 7,500 to 8,500 lb. loads.

In conformity with the generally-accepted practice of painting trucks carrying food products some light color, the Hale-Halsell trucks, tractors and trailers are all painted a bright yellow. Fenders, splashers and wheels are also painted the same color, notwithstanding that the trend is toward painting fenders and splashers black in order to more easily touch up fender nicks, dents and scratches, as well as marks such as those made by the driver's foot on the splashers.

Point Trend

The top of the shortened hood of the Dodge COE tractor is also painted the bright yellow of the rest of the vehicle. On such tractors, which make long road hauls, the trend is toward painting the top of the hood black. Because black absorbs more of the rays of the sun than any light color, there is less reflected light from a black hood. As a result, less light is reflected into the eyes of the driver and the black-hooded vehicle becomes not only considerably safer, but very much easier to drive.

As shown in the accompanying illustration, the Hale-Halsell trailers are skirted on the side. They do not have a side door on the curb side due to the relatively short length of 16 ft. 6 in. All deliveries are made from double doors at the rear of the trailer.

The tractor and trailer lettering is black. The company name is painted on each cab door and on the nose of the trailer at the top, where it can be seen above the top of the tractor cab by the drivers of approaching vehicles or pedestrians looking at the unit from the front.

To take the fullest advantage of the advertising value of the company's automotive equipment, the sides of the trailer bodies are painted with a double sunburst in green, orange, red and yellow with the legend, Hale's Pride Quality Foods. Kept clean and well washed, the Hale-Halsell equipment is considered to have a definite sales value.

Other details of the tractor-trailer combination include an aluminum-painted trailer roof, both for appearance and to keep the interior cooler by a better refraction of the sun's rays; vacuum brakes all around; the same sized tires all around, so that one spare tire will serve all wheels; and reflectors and marker lights to meet I.C.C. safety requirements.

Thus, by overcoming many of the factors that interfere with profitable operation in wholesale grocery delivery, in a sparsely populated area, Hale-Halsell has made their method of truck distribution pay dividends.

How To Get M.I.D. Label Approval

Processors must know what steps to take in preparing labels and securing approval for products subject to BAI inspection. They should be familiar with all the labeling requirements as well as with what constitutes deception

By C. H. PALS, Chief, Trade Label Section, Meat Inspection Division
U. S. Department of Agriculture, Washington, D. C.

IN RECENT months, many small processors have indicated their interest in obtaining information on Federal regulations applicable to the labeling of meat products and products containing meat. Processors likely to be interested in the meat inspection label regulations include packers of prepackaged fresh or frozen meats, precooked frozen foods or meals with meat, or canned foods containing meat. Plant officials and employees accustomed to Federal meat inspection are in general familiar with these regulations. They are summarized here for the benefit of small processors less familiar with these requirements.

When Congress enacted the Federal meat inspection acts more than 40 years ago, it vested in the U. S. Department of Agriculture broad powers of administration. These powers were, in part, discretionary. They included authority to make necessary regulations, to change them, as need arose, and to keep the inspection work abreast of new scientific and commercial developments. All regulations, of course, must be within the original authority of the acts, of which that passed in 1906 is the most comprehensive and best known.

Labeling regulations are of public interest because of the informative character of labels. Purchasers and consumers of most canned and packaged meat food products have little information about the contents other than what appears on the label. Packers and processors of federally inspected foods are also interested in labeling requirements. Labels influence consumer acceptance and labeling regulations, like others under the meat inspection acts, have the effect of law. Moreover, all regulations are rigidly enforced. Inspectors are on hand for that purpose. In addition, they often render helpful assistance to the meat industry through their technical knowledge and experience.

C. H. Pals, the author, is chief, Trade Label Section, U. S. Meat Inspection Service.

Where Labeling Is Required

The main purpose of the labeling provisions, under the meat inspection statutes, is to insure the use of labels that are both accurate and properly informative. Plain wrappings used to keep fresh meat from becoming soiled or from drying out need not bear a label. Neither do uncolored transparent coverings such as artificial casings which bear no printed or graphic matter other than that required by the marking regulations. But when an inspected product is packed in a can, pot, carton, canvas, or other receptacle constituting a true container, it must be properly labeled. The container must be filled, and the label applied under the supervision of a Federal inspector.

Labels must be informative and also prominent so as to be readily seen. They must contain: (1) The true and common name of the product; (2) the name and address of the manufacturer, packer, or distributor; (3) the quantity of the contents and (4) the mark of inspection, together with the number assigned to the inspected establishment.

When a product is composed of several ingredients, they must be listed in order of their predominence. Exceptions are made in the case of products for which definitions and standards of identity have been otherwise prescribed. Cartons for edible fats, such as lard and oleomargarine, may have the establishment number omitted when this information is furnished on the inner liner.

The regulations are broad and uniform in their coverage. They apply to institutional style and retail consumer size package.

If a meat food product is prepared in a federally inspected establishment, it is subject to the labeling requirements of Federal meat inspection, regardless of the destination of the product. Requirements are the same whether the product is shipped interstate or is marketed intrastate.

The question is sometimes raised whether a small processor, not operating under Federal meat inspection, may state on his label or package that the meat ingredient in his product was inspected by the U. S. Department of Agriculture, if that were the case. The answer is that no reference to inspection is authorized unless the product is prepared under inspection. No matter how small the operation is, the small processor, in order to have the inspection stamp appear on his products, must have an inspector on his premises. The inspector may be employed part-time.

Procedure for Label Approval

Before being used, a label must have the formal approval of the Meat Inspection Division of the Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C. This procedure for

Two of the commonly used inspection stamps for the identification of all federally inspected meat and meat food products.

obtaining approval is simple. Some persons have employed attorneys to represent them, but that is unnecessary. The customary method is to submit the proposed label to the inspector-in-charge at the establishment, who will then take the necessary steps to obtain the desired formal approval.

If desired, a sketch or proof may be submitted first and later the finished label. If preferred, the preliminary sketch or finished label may be sent directly to the Chief of Division at Washington, D. C. In order that proper records may be kept, three copies of sketches are desired, and four copies of the finished label, regardless of the route of submittal.

The purpose behind advance official approval of sketches is to insure that they comply with the meat inspection laws and regulations before large numbers of the finished labels are printed. Meat inspection officials are familiar with the problems of commercial industry, and endeavor to make the requirements and procedures reasonable and free from hardship. To this end, the inspector-in-charge at an establishment has authority to permit certain modifications in labels to meet seasonal or other needs. For example during Christmas and various special holidays, wrappers may contain floral designs or illustrations of rabbits, chicks, fireworks, or other designs emblematic of the occasion. Other minor changes that do not affect the accuracy or clearness of the label may also be authorized by the inspector-in-charge at the plant.

Labels of federally inspected meat products must name the product accurately and show ingredients. The name of the packer or the distributor must also appear on the label.

Regulations for products intended for export permit informative statements, in a foreign language, regarding contents and weight that conform to usage of the receiving country. But in all cases the inspection legend and establishment number must appear in English although, in addition, it may be literally translated in foreign-language text.

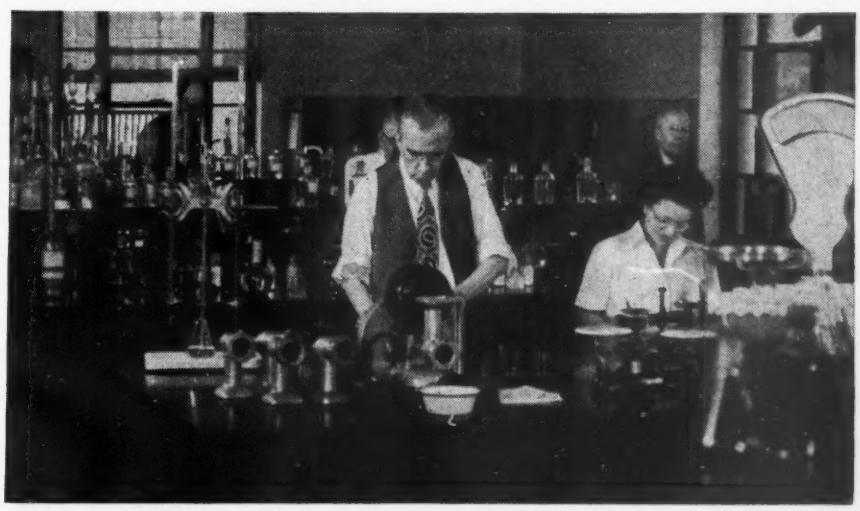
Deceptive Labels Prohibited

The longest and most detailed regulation on labeling deals with the prohibition of false or deceptive names. Since a subject of this kind is naturally subject to various interpretations, the regulation contains a number of typical examples as a guide.

One section prohibits misleading pictures. For instance, a picture of a dairy cow on a carton proposed for margarine would be considered misleading, since margarine is not a dairy product. A food that imitates another well-known product must bear the word "imitation." Terms having special geographical or local significance must not be used in a misleading sense. Hams, for instance, must not be marked "Smithfield" or "Virginia" unless prepared there.

The restriction does not apply to a geographical term that has come into general use and is, therefore, not misleading. Examples of this latter point are "frankfurter" or "vienna" as applied to sausage, or "Irish" as applied to stews. Such terms as "farm" or "country" are not permitted on labels of products unless they were actually prepared on the farm or in the country. If, on the other hand, the manner of commercial preparation is the same as the farm method, the product may be labeled "farm-style" or "country-style." Seasonal references must also be accurate. The term "spring lamb" is applicable

(*Continued on page* 204)



Laboratory analyses are conducted on meat ingredients of food products to see whether they agree with the information on the container label.

Time Studies Show How To Reduce Distribution Costs

Evaluation of distributor efficiency, through these studies, brings to light many hidden factors that build up costs and lower output. The driver-salesman as well as his company can gain by following the plan outlined here

By ALEXANDER MORROW, Consultant, Chestnut Hill, Pa.

SINCE the first world war the milk industry has adopted many technical improvements in receiving plant, transportation and processing operations resulting in markedly lower costs. Thus, between the wars production per worker increased six-fold in country plants and doubled in the city plants. Production per worker trebled in transportation services. As in other industries, increasing efficiency was achieved through mechanization and the wide use of procedures whereby the performance of various functions could be standardized and their costs measured exactly.

The distribution of milk has lagged behind, however, because the costs involved have seldom been known accurately and its functions never managed in a scientific way. In the 1920-40 period, there was a 40 percent decline in the output per distribution worker accompanied by rising wage rates. It is true that advances in distribution are hindered by the fact that they usually require changes in services to consumers, whose attitudes cannot be regulated as are processing operations. But milk distribution costs are a considerable part of the sales dollar and offer the broadest opportunities for cost reduction.

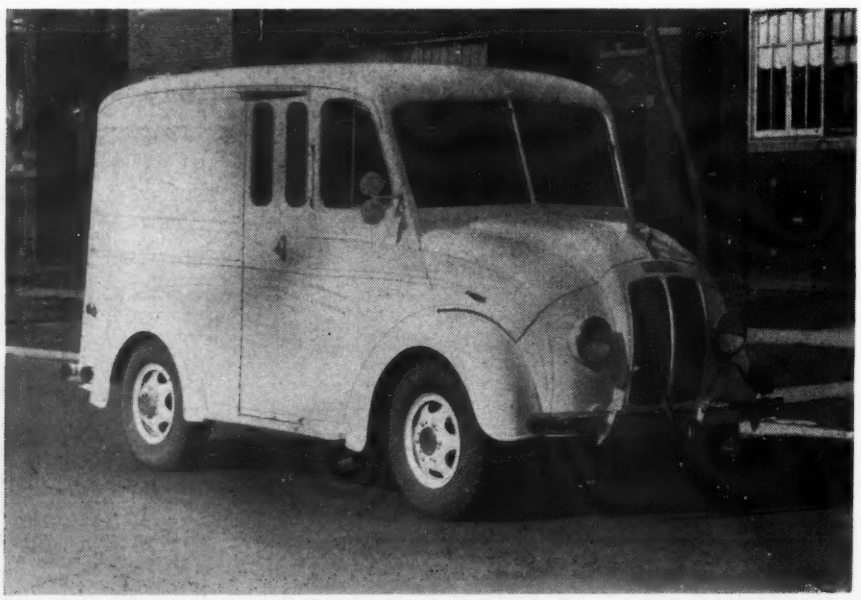
Wartime Efficiency

The low output per distribution worker, before 1940, was caused by smaller consumer purchases and the increased number of dealers in most markets. During the war period the efficiency of milk distribution rose sharply in terms of volume handled per worker. Larger route loads were brought about by higher per capita purchases of milk and also by various changes in marketing practice, which reduced the frequency of delivery and limited other customer services.

The effort to retain every-other-day delivery, the major wartime economy, is commendable. But I believe that the milk business must not be satisfied with this measure. Milk distribution will not enjoy steady reductions in cost unless it is subject to the same continuing analysis that has made possible constant progress in processing.

The pattern of milk distribution has changed very little since the days when Farmer Jones delivered milk from his cows to families in the town. The milk business has expanded considerably and a particular company may have a thousand routes, but the driver's functions have remained substantially the same over the years. He loads and unloads his vehicle, delivers milk to his customers and makes collections, carries on a certain degree of sales effort and handles all of the clerical work involved. The services offered to customers have depended on competition and the zeal for volume. The dealer has known very little about the costs of these services to him.

The cost of various distribution functions and the time spent in performing them must be studied. We must break down the "times" required to perform the various elements of the driver's job. We must be able to measure the effect that changes in distribution practice will have on the way the driver spends his working day and the average time required to serve a customer. If off-the-route-functions, such as loading and unloading, are not performed by the driver, for



Divco Corp. photo

This is the 44-case truck now used on the average retail milk route. With per capita consumption on the increase, the efficiency of these smaller trucks is open to question.

example, how much additional time will be made available for delivery on the route?

Seek Standard

Time study is the tool that will enable us to break down the driver's job into its various elements. The aim of time study analysis in milk distribution is to determine the standard time in performing each function under various operating conditions. We could not use overall time studies because we would have to make new studies every time we changed routes or our distribution practices. In this way, given a particular set of route conditions, it would be possible to determine what the standard route load should be if the driver performs a particular group of functions.

Time studies would give us a sound method of converting the time saved in reduced services, or fewer functions, into the additional quantity of milk the driver could deliver in that "saved" time. By analysis of this kind, management will discover which functions are being performed at excessive cost and how to reorganize them so that profits may me maximized.

Two Classifications

Nearly all of the driver's functions fall into two groups, constant and variable. We may consider those functions as constant that are not influenced by route volume or mileage, the number of customers served and packages delivered. In a plant with similar vehicles, the same loading platform and other equipment, constant functions will take the average driver the same length of time. We may determine whether a particular element is constant by asking whether more time would be required to perform it if we enlarged the route load. If the time remained the same, we would know that the element is constant or fixed.

Fixed time includes such activities as servicing the vehicle, icing, waiting to load and unload, bookkeeping in the office and personal time.

A variable function is one in which the performance time is definitely influenced by changes in some factor on the route, such as the number of customers and packages or the types of dwelling in which the customers live. Variable times would include driving time from one customer to another, time per delivery and collection call and the number of packages delivered per customer.

In order to obtain elemental "times" that fairly represent the company's operating problems, routes that represent a cross-section of the company are selected for study. Since it takes a varying amount of time to serve different types of dwellings, the routes chosen should represent all kinds in the market. Observers, trained in time studies, accompany the driver from the time he enters the plant to his departure at the end of the day. The time is determined from a stop-watch and is recorded on the observation sheets.

An element is a definite action or motion performed by the driver, which can be timed precisely. In order that an adequate analysis may be made of the driver's job, all conditions relating to the delivery must be described on the observation sheets. As the route man does his work, the observer records all the necessary information, such as type of dwelling or the distance from the vehicle to point of delivery, collection calls made and the length of time required to drive from one customer to another.

We may determine from this analysis the time spent by the driver on each variable element, given certain route operating conditions. The time required to drive between the dwellings of customers will depend upon customer density or the number of customers per mile. Since the amount of time per delivery depends upon the distance of the house from the curb and the number of customers served by the driver before returning to the truck, we try to develop a standard serving time for each type of dwelling. This will vary, of course, if the customer lives in an apartment or row house.

The time spent in collecting per customer per day will depend on the frequency of collection and whether collections are made at the time of delivery or on a subsequent call. The time required in shifting the load or handling packages will be related to the size of the load.

Adjust to Standard

The standard is supposed to be the normal performance of the average driver working at a normal rate of speed. It may be asked, what happens if the driver being observed is faster or slower than the average. Each driver is given a performance rating by the observer in order to adjust his performance to an established standard. If a man is observed to be slow, his times are raised. The times of fast drivers are lowered. From all of the performance times reported in the time studies, standard times are developed for the performance of each element under various conditions. The standards should be tested to be sure of their accuracy.

Practical Results

The major aims of a milk delivery system are to deliver milk and to sustain sales volume at a satisfactory level. It is astonishing to observe that drivers spend only about half of their working day in serving customers—driving from one customer to another, making deliveries and collecting bills. Almost half of the day is devoted to off-the-route functions.

This condition is undesirable for

Divco Corp. photo

A 100-case truck, used in experimental milk route time studies, resulted in increased efficiency by cutting some of the fixed costs that enter into door-to-door distribution.

various reasons. Among the major expenses in maintaining a delivery system are those related to the vehicle. A large proportion of idle truck time means that the vehicle is not being used at the highest point of utilization. The cost of an idle truck can be measured by the fixed costs on the truck. Depreciation, insurance, licenses, taxes, garage rent are fixed expenses and continue whether or not the truck is working.

In addition, a high percent of idle truck time increases the number of routes required to deliver a given quantity of milk. This involves many additional costs, particularly fixed and variable truck expenses and also increased labor costs. A larger number of routes entails greater clerical and supervision expenses.

Fixed Time

Since a large proportion of the working day consists of fixed functions, it would be desirable to reduce this segment of the route day in relation to the total. Fixed time consists chiefly of route preparation functions, which are not directly productive from the standpoint of delivery and sales—the highest skill of the driver. A route man at present performs many different jobs, each commanding a different rate of pay in the labor market.

A salesman's compensation is generally greater than that of a bookkeeper. Yet, we find the routeman receiving a salesman's salary for devoting considerable time each day to clerical work that can be performed with greater competence by a girl, who has completed a commercial high school course. Loading is remunerated at relatively low wage rates, but the driver, who receives a much higher rate of pay, spends much of his time at this activity. Moreover, he wastes a surprising amount of time in waiting to load and unload.

Time studies would enable us to determine how much time is spent on particular routes in performing a particular function. If the driver is no longer expected to perform that function, how much additional time would he have available for delivery and sales activities and how much time is required on the route to serve a given customer?

Ways to Cut Costs

How can the job of the driver-salesman be redesigned to achieve lower distribution costs? For example, route preparation functions such as loading and unloading can be performed by other persons. Our analysis would enable us to convert this additional time into increments to the route load. If loading is performed by a special loader, we can measure the additional costs incurred by hiring such labor. The time required to load has been set up in our standard and we can cost the job by the average rate for such work. The savings would be achieved essentially by reductions in labor and vehicle requirements. The net savings could be determined by subtracting the additional costs from savings.

The performance of route preparation functions does not, of course, affect the service offered to consumers. But we may, for instance, want to study the effects of less frequent collections on the time required to serve an average customer. Time study analysis would provide us with the means of determining the increase in route loads, which would then be possible without changing the length of the route-day. By cost analysis we could establish the degree of monetary savings in adopting this or any other change in distribution practice. Of course, consumer reactions would have to be appraised before adopting any change of this nature.

Selling Time

Sales effort is one aspect of the driver-salesman's work. If the sales department decides there is much potential business on a particular route, a time allowance would be made to permit the driver to carry on this sales activity. If it is felt that the potential business is comparatively limited, less time would be set aside for this portion of the driver-salesman's job. It has been felt that time study analysis would destroy the possibility of sales effort. Actually, however, it would only be provided for on a more objective basis and the sales potential on a particular route could always be balanced against the extra costs incurred by carrying a load less than the maximum.

The savings that would follow from the employment of the program thus far suggested would be contingent upon the delivery system adopted and the labor rates prevailing in a particular area. It is apparent, however, that they would be substantial. The costs of purchasing and maintaining vehicles would be lessened because fewer of them would be required. The effect of the reduction in the number of routes on labor costs would vary with the type of wage arrangements.

The Table on this page illustrates the effect of route volume on labor cost per quart under several arrangements.

Savings per Unit

The maximum savings per quart would be derived by a contract providing for a flat wage. Under the data presented in the table, the route labor savings would be 1.6 cents per quart offset by the additional costs incurred in having route preparation functions performed by others, if that plan were followed. These labor cost savings would be less under a fixed wage and commission arrangement and would disappear under a full commission arrangement. In all instances there would be savings in vehicle purchase and maintenance costs.

Under any plan which would increase the productive functions of the driver as reflected in a greater volume of deliveries, there should be a downward adjustment in the commission rate. Since the rearrangement of route functions results in greater dollar sales without demanding more physical effort of the driver, this is only just. This does not mean that the driver should not obtain any benefit from increased efficiency. The historic trend in this country has been to raise wages as the productivity of labor increases. But it would be wisdom for labor to recognize that these savings should

(*Continued on page* 202)

TABLE I—Effect of Route Volume on Unit Labor Costs for Several Types of Wage Contracts Common in Connecticut*

Route labor cost in cents per quart[1]

Weekly Wages[2]	Daily route volume in quarts					
	300	400	500	600	700	800
$44	2.6	1.9	1.6	1.3	1.1	1.0
$20 + 7%	2.6	2.3	2.1	2.0	1.9	1.8
$11 + 10%	2.6	2.5	2.4	2.3	2.3	2.2
12½%	2.5	2.5	2.5	2.5	2.5	2.5

*From "Efficiency of Milk Marketing in Connecticut," published by Storrs Agricultural Experiment Station, Department of Agricultural Economics, University of Connecticut, Storrs, Conn.

[1]Route labor costs have been increased six percent to allow for higher wages paid to relief drivers and for vacations with pay.

[2]Commissions are based on collections and also on deliveries during a 7-day week, with retail prices of 16 cents per quart. Retail price ceilings established by the OPA for family grade milk were only 15 cents per quart prior to October, 1943, in some secondary markets and 15½ cents since that date. In other markets the ceiling price has been 16 cents per quart in both periods.

EDITORIALS

LAURENCE V. BURTON, Editor

For Better Army Cooking

IKE EISENHOWER has ordered something done about army chow. At last, food preparation and service will be recognized as a career rather than an unwanted job. With this action, the soldier should receive meals just as good as can be purchased in civilian life, provided the order is executed with spirit and enthusiasm.

About three years ago we spent two hours trying to sell Quartermaster General Gregory on the idea of special compensation for army cooks in the way of better pay and special leave for good work as a means of improving the quality of army meals. But General Gregory wasn't having any. Now that the Hennessey Report has been made to the Chief of Staff, the desired action seems to be forthcoming.

All the army's subsistence purchases are of the same, or even better, quality of food than most of us purchase for our own homes. Yet unwilling or inept cooking and service can convert it into something that the average GI will despise. Outside of the human factors in the mess hall there is no reason for any difference between the palatability of army meals and civilian meals.

Frozen Food Distributors Up in Arms

With heavy, high priced inventories on hand, frozen food distributors met with packers at the recent San Francisco convention in hopes that an educational publicity advertising program could be arranged. The plan proposed was to be a joint effort in which packers and distributors would foot the bill. To May 1st, the packers on the planning committee (the committee is composed of packers, distributors and brokers) has shown no signs of initiating a second promised meeting, agreed upon at the convention, when the tentative plan was to be revised and put into action.

More than one distributor has indicated vexation at the pushing around they have received, as well as the patronizing attitude of packers toward them.

The evidence would indicate that some of the pushing around was due to failure of distributors to push their plan to a successful conclusion at the convention—rather than to leave it in the hands of a committee whose members are widely scattered over the country.

But this does not account for the apparent lethargy of the packers in acting upon the plan set up for the Frozen Food Council to promote frozen foods.

Is it possible that packers do not yet realize that their channels to market can no longer be taken for granted? To the extent that he is next of kin to the retailer and the institutional user of frozen foods in the distribution family, the distributor is at least a second cousin to the consumer. And the consumer or user is the person who, from now on, must be **sold** food products, whether they be fresh, canned, frozen or dried.

A rude awakening may await some packers when they approach distributors with offers from their 1947 packs. In such critical times as these, cooperation and mutual understanding are needed.

What Quality Is Like

"QUALITY is like the stratosphere—the higher up you go, the less pressure you have to buck," says Watson Rogers, President of National Food Brokers Association. "The greater the quality control and supervision over what goes into your foods, the less you have to worry about making price concessions that eat away your profits."

Reports coming to Food Industries regarding factory inventories confirm the foregoing statement. In general there is scarcity of top quality, but low quality items are a bit sticky.

Don't Confuse the Consumer

DURING these days of problems of adjusting inventories and prices downward, some food processors are apt to forget little details that confuse the lay consumer. Unfortunately, the housewife is seldom given to critical reading of labels and too often sees only the price tag on the shelf of a self-service store. It would be happier all around if she could be induced to study labels, but since she will not often take the time to do so, it behooves processors to exert themselves to avoid confusing her.

Examples of confusion that recently have come to our attention were canned apricots and frozen cherries. Side by side were 'cots in the same sized cans at 35 cents and 21 cents. In this case it was possible to explain the discrepancy in price, for the former were packed in heavy sirup whereas the latter were packed in water. But, in the case of the frozen cherries reported to be marked at 29 cents and 19 cents, one could only surmise a possible explanation. The consumer never thought of looking on the label which, in the case of frozen foods, is frequently only dimly visible through the overwrap. Whether the price difference was due to difference in sugar content, difference in quality, or whether the lower priced item was repacked barreled fruit sold at distress prices, one can only conjecture.

Had it been a service grocery it is likely that the sales personnel would have explained the difference. But in self-service stores the manufacturer is dependent largely on the amount of in-

formation the label will display. Unless adequate care is used in devising labels, it is possible to disappoint many a housewife who may think she is getting high quality at bargain prices. When she is disappointed a whole segment of the industry, not a single processor, loses a customer.

Bacteria vs. Quality

THE extent to which bacteriological control laboratories have entered the frozen food field is very gratifying to all who are interested in improved methods of food processing. In the case of foods containing sugar that, as a consequence, are never completely frozen—even at −10 deg. F.—close control of the number of permissible bacteria is of greater technological importance than in the case of foods like vegetables that are more completely frozen. A plate count of 10,000 per gram or cubic centimeter appears to be the maximum permissible.

At the present moment nobody seems to be quite certain why there must be definite limitations on bacterial counts, but the public health aspect of such a matter is seemingly of minor importance compared to the deterioration of quality that is evident when the numbers of bacteria get out of hand. No evidence is available to prove that quality deterioration is the result of bacterial growth or metabolism, but there is pretty general agreement among food technologists that deterioration is definitely associated with high bacterial counts.

Design Aspects of Sanitation

WHAT appears to be something unusual as a source of mold contamination has come to light. In one plant, the product from a large vacuum evaporator would occasionally show considerable quantities of mold under the microscope. It took a lengthy search to find the cause, for the raw materials entering the evaporator carried only an infinitesimal amount of mold—too small to be evaluated. Yet at irregular intervals certain batches were badly contaminated.

It was finally discovered that entrained food solids were accumulating in a horizontal vapor pipe of large diameter leading from the evaporator body to the barometric condenser. In the humid, warm atmosphere existing there for considerable periods, the molds could grow luxuriantly without giving trouble. Occasionally, however, there would occur a surge or drop in the vacuum that drew mold back into the evaporator body. As long as everything was proceeding normally, there would be no trouble, for the mold or its spores would be carried forward into the barometric condenser. But when something developed that momentarily lowered the efficiency of the condenser, the vapor flow would be reversed.

A great deal of study was required to locate the cause of the trouble because there was no way to get into the pipe short of dismantling the equipment with a cutting torch in the busy season. By deduction it was shown that the contamination had to come from that point and no other.

Once the correct diagnosis was reached, it took little time to change the slope of the pipe from horizontal to an effective gradient *toward the condenser*. This made any entrained liquid drain away to a place where it could do no more harm. A provision for washing out the pipe was also installed. And now there is no more trouble.

Engineers who design equipment and have no intimate knowledge of the specialized problems of the food industries need guidance if they are to avoid the creation of problems such as this.

New "Sweeteners"

IT appears that some powerful new sweeteners are due to appear on the scene as soon as Prof. Peter E. Verkade, of Delft Technical University, Netherlands, makes the necessary patent arrangements. The United States food laws, being what they are, make Professor Verkade's wartime discoveries more important academically than commercially.

His discovery of a related series of chemical compounds ranging in sweetness from 120 to 2,000 times the sweetness of sucrose, compared to saccharine's 500, is fascinating. But the fact that the most powerful sweetener of his series has the composition 1-N-propoxy-2-amino-4-nitrobenzene, sheds little light on the "mechanism" of the sweet taste. While no food value is claimed for his compounds, one wonders about their physiological properties. Nitrobenzene, even with a tail as long as a Democratic Donkey, may present some problems requiring extensive pharmacological investigations to prove it is safe to eat.

Correct Way to Adjust Wages

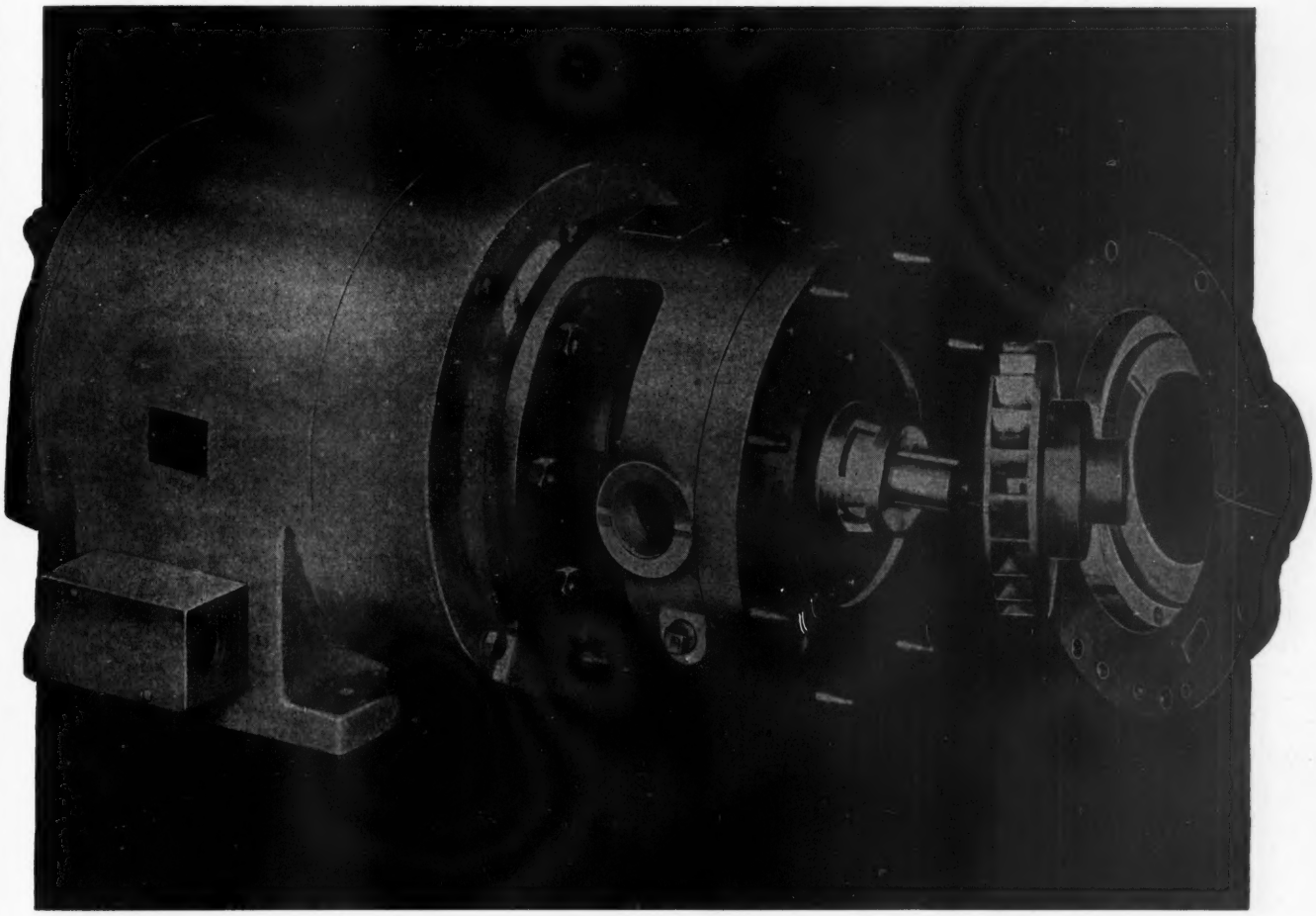
IN your plant the matter of wage increases should be handled with consummate skill. Blanket wage increases are absolutely unappreciated by most employees. Every wage adjustment, where there is no outside interference, should be made on an individual basis. Blanket raises are usually regarded as something overdue to the employee.

One company uses the following letter very effectively:

"It is a pleasure to tell you that with this check you are to receive an increase in compensation recommended by Mr. ———— (foreman or superintendent)." The letter is an original—never a mimeo or carbon or printed job—and signed by Mr. Big himself. It takes advantage of a rare opportunity to tie the individual to his superior and the superior to the management. In that concern the increases are modest in size, but they are fairly frequent, and the company never waits for a requested increase.

To our way of thinking, this is a much better way than posting a notice or sending out a form letter.

The Nash Clean-Air Compressor has but one simple moving part.



The Nash Clean-Air Compressor has but one moving part, cast in one piece and rotating in the pump casing without metallic contact. No internal lubrication is necessary; therefore air or other gas compressed with a Nash is entirely free from oil contamination.

Dust and heat are removed from the air, or gas compressed, by the unique Nash "Liquid Piston". Air from a Nash Compressor is therefore delivered free from dust, heat, or oil, without supplementary filters or air washers, in a perfected mechanical structure with no internal wearing parts.

Air or gas from a Nash Compressor may be used for agitating, blending, maintaining pressure on storage tanks, or moving liquids and materials by pressure displacement, in connection with the most delicate food, beverage, or chemical process, without danger of contamination.

Bulletin D-252 tells all about Nash Clean-Air Compressors, and it is free on request.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Mix With Yeast

THE ever-growing list of baking preparations now includes a hot roll mix, complete with yeast.

Duff's Baking Mix Div., American Home Foods, Inc., Pittsburgh, Pa., presently is testing Duff's Hot Roll Mix in one or two markets.

The blend consists of enriched flour, vegetable shortening, dry non-fat milk solids and salt. These ingredients are wrapped in a large bag, the dried yeast being in a separate small envelope.

To prepare, the yeast is dissolved in one cup of warm water and the mix is added and blended for about one minute. The first and second raisings require about one hour each at a temperature of 80 to 85°. Baking time is 15 minutes in a moderate oven. Yield is from 12 to 18 rolls. Directions also are given for the refrigerator method.

The paper covered carton is designed in bright red, blue and yellow with a natural colored lithograph of a few cloverleaf rolls. The back and side panels contain profuse instructions and suggestions for preparation.

Net weight is 14¼ oz.

In a Minute

CLEVELAND, Ohio, is the market chosen by General Foods Corp., New York, for testing its new Minute Potatoes, product of many years of research in the company's laboratories.

Idaho potatoes are used, since they were found to have consumer preference. The right combination of milk, salt and potatoes had to be worked out, then there was the problem of breaking the potatoes down into individual cells in order to equalize the moisture content, providing a uniform quantity of proteins and carbohydrates.

When this potato product is dried, it resembles tiny pieces of spaghetti—each particle is a small tube. The pieces are not more than a quarter of an inch long, the tube's diameter being about 1/16 of an inch.

The package of minute potatoes is added to 2 cups of salted boiling water. Result—mashed potatoes in 2 minutes.

Vacuumed Juice

PROCESSED by Vacuum Foods Corp., Plymouth, Fla., and distributed by The Crosse & Blackwell Co., Baltimore, Md., Minute Maid Orange Juice Powder is orange juice condensed into powder by a new high vacuum method.

A pint of juice is made from 2 oz. of powder. Orange oil, to standardize the flavor, is the only addition to the pure juice.

To date, most of the powder has been shipped overseas to aid in the European feeding program. The product is convenient for shipping and storing since the 2 oz. can is so small and light.

Ice Cream

THE advent of another summer season has brought with it several new prepared ice cream products as well as redesigned containers. Among them are, Lady Borden Ice Cream, made by the Pioneer Ice Cream Div. of The Borden Co., New York; Holly Carter Ice Cream, put out by The Great Atlantic and Pacific Tea Co., New York and the Golden State Brand Ice Cream of Golden State Co., Ltd., San Francisco.

"Fit For A Golden Spoon" is the slogan Borden is using for its "premium ice cream." Described as having a high butterfat content, the ice cream will be sold in four flavors —vanilla, chocolate, strawberry and one to depend on local preference, season and so forth.

The ice cream will be distributed nationally in one size and style of container. It is a one pint tall Nestyle carton, manufactured by Sealright Co., Inc., Fulton, N. Y. The burgundy red and white printing makes it an attractive and eye-appealing package.

A & P, still in the test stage with its ice cream, apparently is opening a new field of endeavor for itself.

Holly Carter Ice Cream presently is being sold in a few of the company's stores in Milwaukee.

Reports have it that the ice cream has a content of 14 percent butterfat, with an overrun averaging 45 percent and 41 percent total food solids.

To determine consumer preference, A & P is using three different types of containers in its test. They are the flat tray-pack, the square type and the Sealright cylindrical carton. Sizes are pints, quarts and half gallons.

More sales are achieved by using a Jiffy insulated bag, manufactured by Jiffy Mfg. Co., Hillside, N. J., and printed with the Holly Carter name. A small inner envelope is used for dry ice—enough to keep the cream frozen until the consumer wants to use it. All this is included in the purchase price of the ice cream.

Golden State Co. distributes its ice cream in refrigerated trucks that hold 4,000 to 5,000 gallons. The commercial grade cream contains 12 percent butterfat, the caterer grade, 16 percent. Flavors include vanilla, in a blue container, chocolate, done up in light brown, strawberry, dark red, Neapolitan, in a green carton with red trim and a monthly special in the aqua and blue package.

The company uses the Philadelphia quart marked off for cutting. The folding wax coated wrap is convenient as well as eye appealing.

What a Crust

THE first of Pillsbury's new postwar line of prepared mixes has been introduced in a few key cities. The mix has been in the development and testing stage for several years and it is reported that other new preparations by Pillsbury Mills, Inc., Minneapolis, are forthcoming.

Three to four tablespoons of cold water added to the 8½ oz. of mix will make enough pastry for a 9-inch two-crust pie or two single-crust pies.

The red, white and blue package contains recipes for half a dozen different pies.

It is being sold in Chicago, Philadelphia, St. Louis and Gary, Ind.

Sauce

CONTINENTAL FOODS, INC., Hoboken, N. J., is packing a spaghetti sauce—complete, ready to heat and serve. It may be used hot or cold, on meat loaf, poultry dishes or fish, as well as on spaghetti or macaroni. With horseradish and lemon added, it is a good sauce for seafood cocktails.

Contents include tomato puree, peanut and/or corn oil, vegetable protein derivative, potato flour, toasted dehydrated onion, salt, flavoring, spices and dehydrated garlic. No meat.

Eight oz. avoir. are packed in a tin with yellow pasted paper label. Printing is in red, blue and black.

Lipton Old Country Spaghetti Sauce is a member of the company's Lipton Tea family.

Veal Gets the Wrap

A NEW method of wrapping veal carcasses, veal sides, hind quarters and hind saddles has been developed by Armour and Co., Chicago.

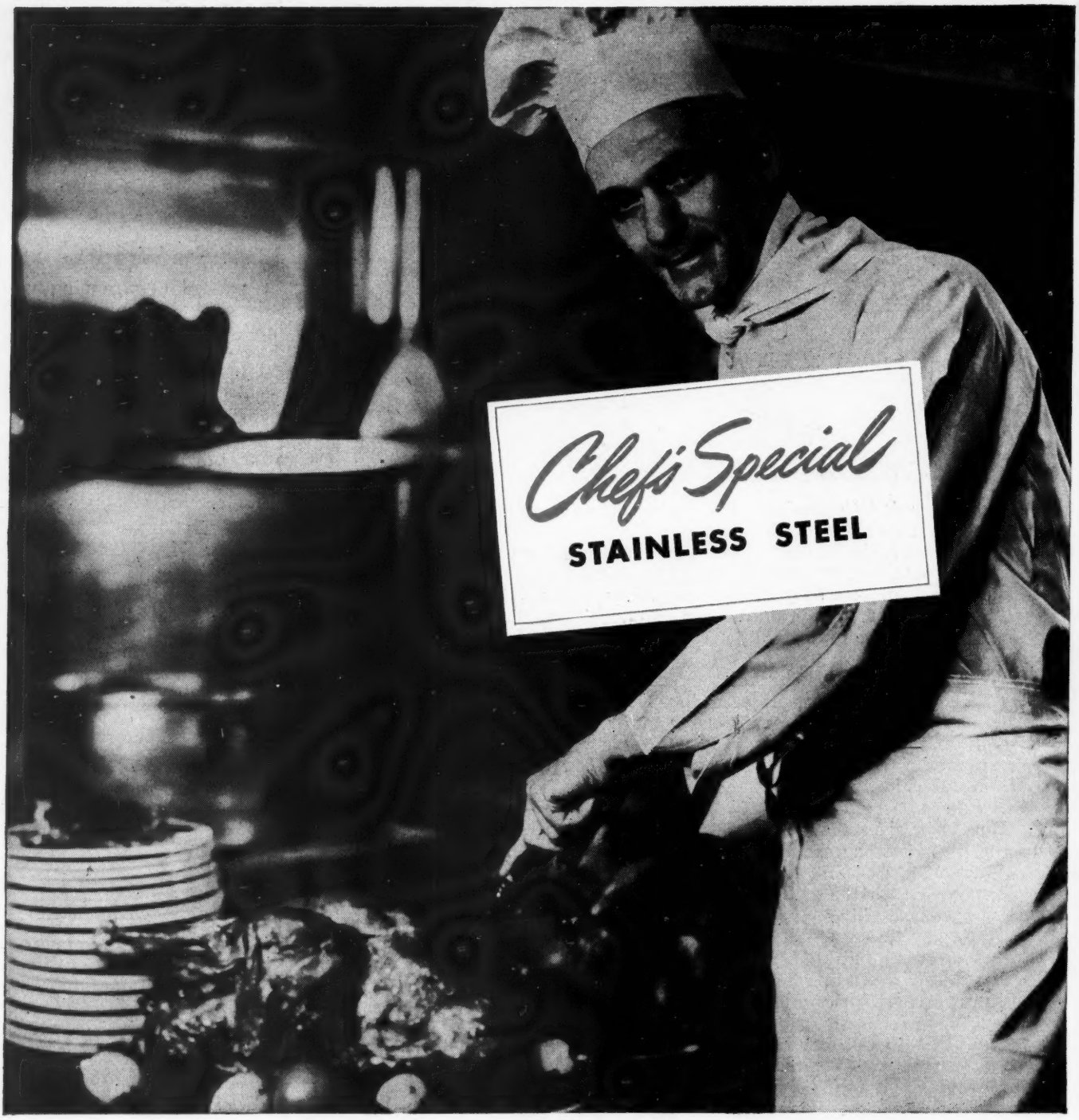
Providing greater sanitation and freshness, the double wrapper of special paper, over-wrapped with a stockinette, is said to prevent discoloration of the meat, dried out edges and loss of bloom. Freshness is maintained in shipping and the wrapper reduces or eliminates costly shrinkage and trimming waste.

Exterior design of the package was executed by Raymond Loewy. It is dominated by the Armour logotype, done in maroon, with a tangerine red star in the upper right hand corner of the trade mark. This color is indicative of the company's fresh meat division and is also used in printing the product name on the white wrapper.

Choose Your Own

CHICKEN in parts is now to be had in frozen form. Packed by Barby's Frosted Foods Inc., Perth Amboy, N. J., Barby's Chicken Parts are particularly convenient for consumers desiring one type of chicken meat.

One may choose a 4x5 in. package, weighing from 12 to 15 oz. net, and containing either: 1. Two legs and two thighs, 2. Two or three breasts, 3. Four to six wings, 4. Two



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or three necks and backs, 5. Gizzards and breasts or 6. Livers.

The parts are wrapped in transparent cellulose, placed in a wax coated folding carton and overwrapped with cellophane.

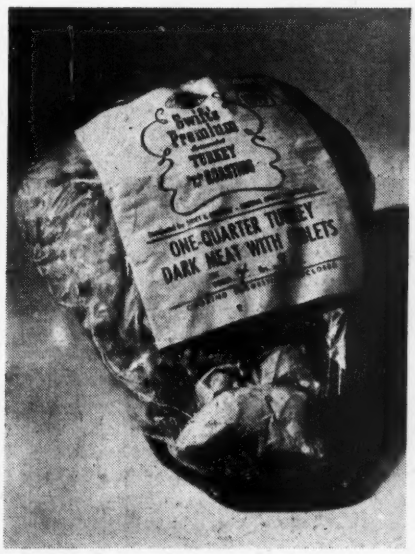
West Shore Beef Co., New York, is the distributor.

Hind or Fore Quarter?

IN an attempt to spur the year round demand for large turkeys, Swift & Co., Chicago, is distributing prepackaged, eviscerated frozen turkey roasts throughout the west coast and mid-west market areas.

The package consists of a quarter of a bird, either all white or all dark meat. The fore-quarter, or white meat, package averages 5 to 7 lb. The hind-quarter, from 6-8 lb., contains the giblets as well.

Individually wrapped in cellulose



and labelled Swift's Premium, the roasts are delivered to retailers in cartons containing 10 or 20 quarters. They are ready to cook when packed.

The item is being processed in Swift's dairy and poultry plants at Albany, Ore., Fresno, Calif., and Clinton, Iowa.

Corn Snack

POP corn and potato chips make way now for a newer competitor—Korn Kurls.

The Adams Corp., Korn Kurl Div., Beloit, Wis., is producing a raw corn meal product, known as Colettes, which is then processed by frying and cheesing. The resulting Korn Kurls are packed 1¾ oz. in a heat-sealed glassine bag.

The cheese flavor enhances the corn meal and the addition of salt makes the product a fine specialty.

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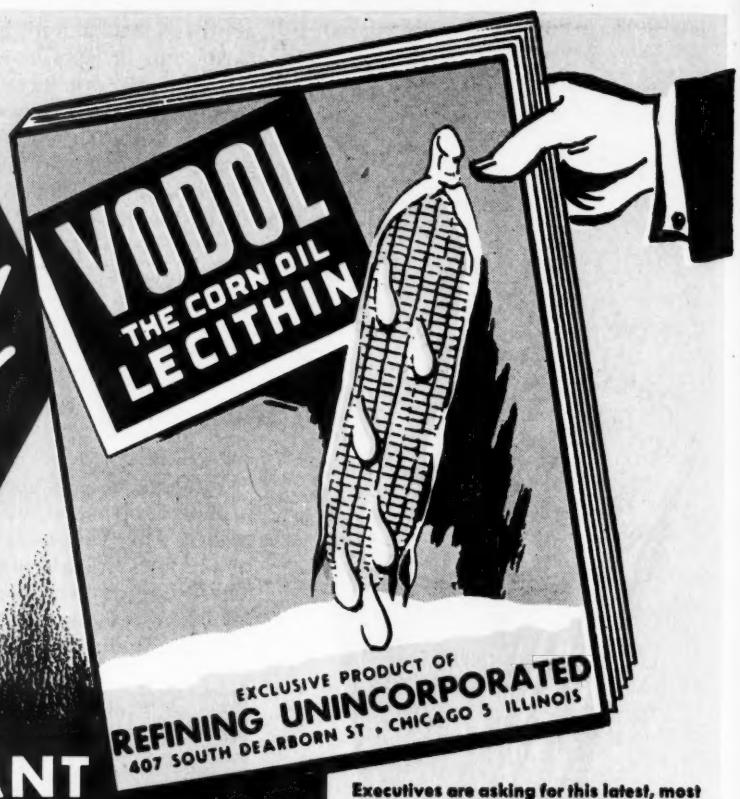

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FOOD INDUSTRY NEWS

GENERAL

Filling of Food Pipelines Is Effective Price Regulator

Cautious buying throughout the industry's distribution channels is slowly bringing about desired price cuts

STILL geared for wartime production during the past season, food processors quickly filled—to overflowing—the empty pipelines to markets. The 1946 pack moved rapidly from packer's hands into that of second and third buyer's. The much talked-of "pent-up demand" has now been filled and, with the exception of a few items, markets are well supplied with most commodities.

Supply now exceeds demand for many processed foods and the wartime market, which was controlled (under governmental regulation) by the seller, is now in the hands of the buyer.

In acquiring control of the market, the buyer also became the owner of a high priced inventory. While sales from the 1946 record pack have been exceptionally heavy, enough merchandise remains in wholesaler-retailer stocks, and as surplus, that buyers are already applying the squeeze to packers.

In Safeway Stores, Inc., annual report, Lingan A. Warren pointed out that the company's buying policy would be as careful as possible, consistent with the needs of steady supplies for retail distribution, but that even such inventory as would be necessary to keep stores stocked would make it impossible to avoid all inventory losses *when food prices decline.* In the company's prospects and plans, he said, food and supplies should become increasingly plentiful during 1947 and, while this will undoubtedly result in lower prices, it should also serve to revive competition as an active element in the food business.

Jewel Tea Co. recently reduced retail prices of some canned fruits and vegetables, but F. J. Lunding, president of the company, cautioned that while the company had reduced prices that higher prices may be restored unless the cost of the 1947 pack is reduced.

Independent retail grocer organizations, such as National Retail-owned Grocers, have advised their members to reduce prices consistent with competition in order to move high priced stocks into consumption.

So far, these price reductions seem to represent little more than the shortening of retail-wholesale profit margins. However, they could be precursors to the revival of prewar price competition.

Fish Group Adopts Promotion Campaign

APPROVAL of a $500,000 annual advertising and promotional campaign was the highlight of the 2nd annual convention of the National Fisheries Institute, held in New York, in mid-April. The program, which was recommended by both the board of directors and the advertising committee, was unanimously endorsed by the membership. A deadline of May 31 was set for the pledging of funds. Each company was asked to pledge one-fifth of a cent per dollar sales.

As the result of a survey, Dr. George Gallup reported that the average housewife is not aware of the many ways of preparing fish, nor of the health value of this food. He urged an educational campaign in line with the promotional recommendations.

Sir John Boyd Orr, director general of FAO, suggested an international organization to increase fish consumption, while Secretary of the Interior J. A. Krug urged an increase in U. S. consumption of fish by at least 1 lb.

O. L. Carr, Mid-Central Fish Co., Kansas City, Mo., was elected to succeed J. L. Alphen as president of the institute. William C. Eardley, Fish and Fillet Co., Seattle, Wash., was elected secretary, and Robert M. Meehan, Washington, D. C., is the treasurer.

Smelter Undamaged

THE TEXAS CITY TIN SMELTER was not damaged in the series of explosions in that city in mid-April. The plant, which was built to refine Bolivian tin ore, when Far Eastern supplies were cut off, began operations in 1942. It turns out more than 43,000 long tons of metallic tin a year.

Press Association

FISH STORY OF MONTH

This mermaid seems to realize the company she is in, and vice-versa. She was among the greeters at the 2nd annual convention of the National Fisheries Institute in New York. Here she is greeting from left: J. S. Eckman, president of the Fisheries Council of Canada; Sir John Boyd Orr, director general of FAO; J. A. Krug, Secretary of the Interior, and J. L. Alphen, retiring president of the National Fisheries Institute.

Press Association

PRICE CUTTING HEADQUARTERS

Probably no single incident in the campaign to lower prices gained as much attention as the 10 percent cut in prices offered by the merchants of Newburyport, Mass., in April.

Depreciation Claims Fare Better in Court

SURPRISINGLY the U. S. Tax Court so far has not had to give any formal opinions on claims for accelerated depreciation due to intensive war use of plant and equipment.

Recent informal opinions, however, indicate the Court can be persuaded by overall statistical evidence of increased activity, whereas the Commissioner of Internal Revenue still turns a fishy eye on all but specific proof that the life of certain equipment has in fact been shortened by unusual beating.

So far the Commissioner of Internal Revenue, holding a stiffer neck than the Court, has denied all claims for accelerated depreciation on a plantwide basis. In some instances, the Commissioner has allowed larger depreciation on certain machines where the taxpayer has proved conclusively that their life was shortened by heavy use.

The Commissioner's position is that accelerated depreciation will not be allowed where obsolescence, inadequacy, or decay control the life of the property; that any modification of normal depreciation will be confined to those items where useful life depends on wear and tear; that, since accelerated use nearly always depends upon increased maintenance, accelerated depreciation is allowable only to the extent that maintenance fails to arrest depreciation.

These factors themselves are enough to block the allowances normally sought, but as administered by the bureau, they are regarded by industry spokesmen as well nigh insuperable. It looks as if any hope for war-tear concessions must be placed in the Court.

Coast Board Reports on Dairy Research

THE CALIFORNIA DAIRY INDUSTRY ADVISORY BOARD has issued a report on the progress of the ten projects currently under research. Projects of particular interest are:

Project No. 5: Effect of heat on milk with especial reference to "heated" flavor and brown discoloration of evaporated milk.

Purposes of this project are to determine the constituents involved, the mechanism of the reaction, time-temperature relationships, and possible methods of prevention.

Browning, it has been determined, results from changes wrought on lactose by heat. Data show that increased browning results from:

(1) High moisture. Maximum in saturated solutions; (2) Increased time and temperature of heating. Appreciable at temperatures above 100 deg. C.; (3) Presence of amino acids, each acid producing a different rate; (4) Presence of metals, such as iron; (5) Increased acidity, and (6) Presence of oxygen. Browning retarded in atmospheres of low oxygen pressure, and stopped completely by bisulfits.

Further determinations will quantitatively measure browning of lactose and of evaporated milk in various atmospheres of varying oxygen pressure.

Study of the effects of heat on the nutritive value of milk proteins will be carried out in conjunction with the Home Economics department.

Project No. 7: Uses of non-fat milk solids.

The purposes of this project are to study the effect of processing treatments on the baking quality of non-fat dry milk solids, and to develop food uses for non-fat dry milk solids.

Milk powder produced by various processing treatments will be used. Proper technics of baking, measuring and scoring are being established. Work is going forward on salad dressings, cereals, gravies, puddings, hot cakes, and biscuits. Objectives are to determine:

(1) The best way to incorporate dry milk solids, and (2) the optimum amounts to use with respect to flavor and consistency.

Also under research are: The optimum amount of non-fat dry milk solids that can be used to supplement wheat proteins in flours of different extractions, and the best processing treatment for dry milk solids to be used with flours of different extractions.

Project No. 8: "Methods of storage of dairy products" will be reported on when more data are available. This project includes a study of the methods of storage with particular reference to storage of frozen products, including market and manufacturing grade cream, plastic cream, and condensed milk.

Hand Succeeds Stotz On Cornell Faculty

DR. DAVID B. HAND, director of research and quality control of Sheffield Farms Company, Inc., has been named by the Board of Trustees of Cornell University professor of biochemistry and head of the Division of Food Science and Technology at the Experiment Station, Geneva, N. Y., to succeed Dr. Elmer H. Stotz who is to become professor of biochemistry and chairman of the Department of Biochemistry, University of Rochester School of Medicine and Dentistry. Doctor Hand's appointment is effective June 15th.

Born and reared in California, Doctor Hand received his early training at Pomona College. He was granted the Ph.D. degree in physical chemistry by Cornell University in 1930 and spent the next two years in Europe in advanced research in biochemistry as a fellow of the National Research Council.

Dr. David B. Hand.

He returned to Cornell in 1932 and spent the next ten years there in teaching and research in biochemistry, assuming his present position with Sheffield Farms in 1942.

Doctor Hand is a member of numerous professional and honorary societies, including the Institute of Food Technology, the American Chemical Society, the American Dairy Science Association, the New York Academy of Sciences, the Industrial Research Institute, the Society of Chemical Industry, and Sigma Xi, national honorary research fraternity. He is married and has two children.

Anti-Trust Clause Mars Trademark Law

WHILE the U. S. Patent Office is getting set to put a new trademark law into operation July 5, a substantial group of trademark lawyers are figuring how they can get Congress to amend it. Momentary problem is finding a Senator who is willing to carry the ball against almost certain opposition from the Justice Department and the Federal Trade Commission.

The trademark bar is sold on the main features of the Lanham Act but would like to get rid of new deal amendments exacted last year by Sen. Claude Pepper's Senate Patents Committee as the price for passage. Lawyers who were "in" on the final bargaining over a bill which had been pending 10 years now wish they had waited another year for the 80th Congress to finish the job.

Dragon fly in their ointment is a little paragraph which makes use of a mark in violation of the anti-trust laws—if proved—a valid defense in any infringement suit. Lawyers say it's an open invitation

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GENERAL MILLS' AMAZING NEW PRODUCT

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Pyequick — General Mills' newest Betty Crocker product — gives the housewife all the ingredients for a delicious apple pie in one convenient package. Apple slices, salt and cinnamon, are in one carton, the piecrust mix in another, and both cartons are enclosed in an attractive, eye-catching wrapper by our Model FA machine.

This machine—the most widely used in the packaging field—has time and again demonstrated its ability to produce uniformly perfect packages at cost-cutting speed. It is, moreover, extremely versatile—adaptable to practically all types of wrapping material in sheet or roll form. And it can be quickly adjusted, enabling a manufacturer to wrap a number of sizes on a single machine. New products or new sizes can be added to the line without the need of investing in additional machines.

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to infringers to appropriate marks of big companies that have been involved in anti-trust litigation. They say it makes every infringer an anti-trust policeman; gives them a royalty free license, and generally balls up the whole process of defending private property in trademarks.

A bill to strike out this feature of the Lanham Act and other Pepper provisos is expected to be introduced as soon as some Senator can be found to sponsor it. Supporters include the U. S. Trade-Mark Association and the patent law section of the American Bar Association.

Former Rep. Fritz G. Lanham, who worked for 10 years to get Congress to modernize the trademark laws, feels that amendments are desirable. The ex-congressman represents the National Patent Council, Inc.

Already pending in the House is the Gossett bill (HR 2988) which would soften the Lanham Act by requiring owners of existing marks to publish them under the new law in order to get any of its benefits. The effect is to take such marks out from under the Lanham law unless the owner wants his marks to become incontestable and is willing to accept the "anti-monopoly" qualifications tacked on by the Pepper committee.

Sponsors of Rep. Gossett's bill feel that trademarks have been a "step-child" in the Patent Office. To correct this they would provide for an Assistant Commissioner for Trademarks who would be an expert in this field.

Meanwhile, the Patent Office has finished a tentative draft of new procedural regulations on handling trademark applications, etc., under the Lanham Act. Copies of these rules became available from the Patent Office this week; hearings on them will be held May 23.

Trullinger Becomes Assistant in ARA

SECRETARY OF AGRICULTURE CLINTON P. ANDERSON has appointed Dr. R. W. Trullinger, Chief of the Office of Experiment Stations in the Department, to the position of assistant administrator of the Agricultural Research Administration.

Dr. Trullinger will continue as chief of the Office of Experiment Stations. This arrangement provides for bringing the Office of Experiment Stations into closer contact with the over-all planning of research in the department. In this capacity Dr. Trullinger will work closely with Dr. W. V. Lambert, administrator, and Dr. Byron T. Shaw, assistant administrator.

Food Meetings

THE 41st annual convention of the National Canners Association has been set for the week of Jan. 18, 1948, and Atlantic City will again be the convention city. As in the past, the Canning Machinery and Supplies Association will hold its convention and exhibit simultaneously, while the National Food Brokers Association will meet a week earlier.

Wide World

NO RATIONING IN BELGIUM

This well stocked grocery store in Brussels is in marked contrast to shops in Britain and other European countries, where the prospects are for a dreary continuance of scarcity.

PROCESSING

Dairy Council Offers Refresher Conference

THE summer conference of the National Dairy Council, to be held at the Edgewater Beach Hotel, Chicago, June 16 to 19, is designed for refresher training of Dairy Council directors and staff workers, and to give them the latest possible technical aids and instruction for their basic "selling" of dairy products. The subjects to be covered include:

Resume of new developments in nutrition research; highlights of recent research in dairy science; how to interest the medical profession in nutrition education, through medical schools and through general practice; compatibility of accepted school procedures and Dairy Council standards; discussions of the underlying educational philosophy in utilizing community resources; ways of coordinating community health education facilities with school curricula; recommendations of home economics department to contributing organizations; how to achieve educational objectives through good classroom technics; discussions of the helps that the teacher needs in directing children; exhibits of new teaching materials; and long-range plans for the development of effective activities through speeches, through exhibits, and through visual aids.

In addition there will be conferences on management problems, Dairy Month activities, and appraisals of Dairy Council technics.

New Texas Labs Cover Agricultural Research

INTEGRATED research laboratories designed to cover a broad program in agricultural research, the natural sciences and medicine, were opened near San Antonio, Tex., early last month. The units, to be known as the Foundation of Applied Research and the Institute of Industrial Research, are made possible by the gift of valuable oil property by Tom B. Slick, San Antonio oil and ranch man.

The institute will perform work for corporations on a fee basis and will include departments for chemistry and physics. The Foundation will conduct experiments in farming, livestock improvement, chemurgy and veterinary medicine.

Dr. Gregory Pincus, head of Worcester Foundation for Experi-

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mental Biology, Worcester, Mass., is selecting the research men and scientists who will form the staff of both the Foundation and the Institute.

New Food Tech Courses Offered by Ohio State

FOUR new courses in fruit and vegetable technology will be added to the College of Agriculture offerings at Ohio State University beginning with the summer quarter on June 17, Professor H. D. Brown of the department of horticulture and forestry, announces.

The interest in modern industrial and small-scale preserving of fruits and vegetables has been steadily increasing and has resulted in the new curriculum offerings, Professor Brown said.

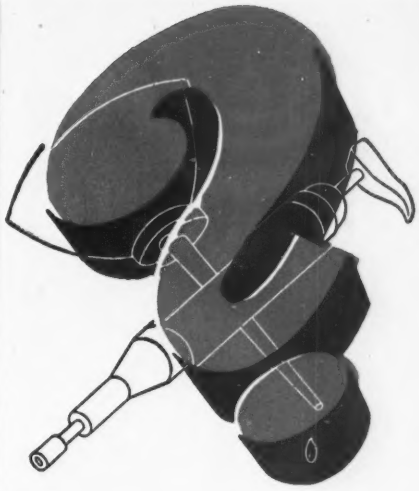
The over-all purpose of the expanded technology program is to give students a chance to learn the beginning-to-end processing involved in the preservation, manufacture, quality control practices and procedures used in fruit and vegetable canning, freezing and dehydrating.

Firm Slices Promise Better Apple Pies

PIE eaters and apple growers both will benefit from research on firming apples slices made by two state experiment stations and its Eastern Regional Research Laboratory at Philadelphia, according to the Department of Agriculture. The research promises apple pie with much more apple flavor, and a new market for the tender, more flavorful varieties of apples.

Studies during the past year by Massachusetts Station and Eastern Laboratory scientists showed that apple slices may be firmed by dipping, impregnating, or cooking them in a solution of calcium chloride, the concentration varying from .1 to 1.0 percent. Then the slices may be frozen, canned or put directly into pie. The full effect of the calcium treatment does not show up until the pie is baked. The heat of baking aids the gelling action of calcium on the pectin in the apple. Tests with nine varieties of summer and early fall apples showed that the calcium-firmed slices gave pies of excellent texture in contrast to untreated slices which broke up or "cooked to sauce" in pie.

The early tests of dipped slices showed that only the surface was firmed by the calcium solution and



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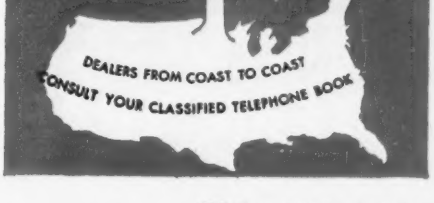

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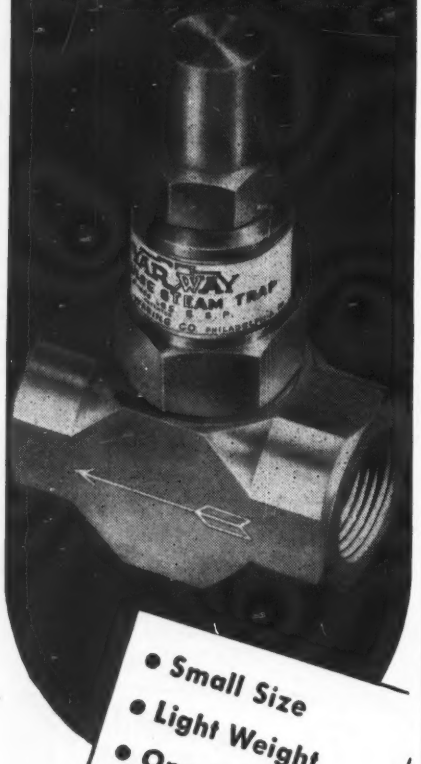

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that the inside was left soft. To get uniform firming the Laboratory found that air must be driven from the slices before dipping. It was also found that as apples become riper, the calcium chloride treatment becomes less effective. For firming very ripe fruit, a combination of calcium and pectase proved better.

Already as a result of the past year's research, several commercial processors are trying out calcium-firmed slices for canning and freezing. One mid-western apple processor has packed a thousand 30-pound cans of calcium-firmed McIntosh slices from fully ripe, full-flavored apples. This illustrates another advantage of the process—the use of fully ripened apples that have the most flavor.

Citrus Committee Discusses Research

BECAUSE of the definite prospect that citrus production will increase by 25 percent between now and 1952, the Citrus Advisory Committee, at their April meeting in Washington, urged that high priority be given to research toward broadening the outlets for citrus, under the Research and Marketing Act of 1946. The committee will submit this recommendation and others pertaining to citrus research to the National Advisory Committee and the Department of Agriculture for their consideration in planning an over-all program under the new Act as passed last August.

Florida Citrus Makes Vitamin Test Grant

THE FLORIDA CITRUS COMMISSION has authorized the expenditure of $2,400 in the form of a grant to the New York Medical College to make tests on two groups of persons known to be suffering with vitamin deficiency to see whether natural or synthetic vitamins produce the greater improvement.

C. C. Commander, of Tampa, has expressed the opinion that the citrus industry may some day be faced with synthetic orange juice, fortified with all needed synthetic vitamins, and the public may think real orange juice is not necessary.

The research program is to combat inroads made in citrus consumption by synthetic vitamins. The project, compliments the recommendations made by the Citrus Advisory Committee in April.

Frozen Food Output

PRODUCTION of frozen fruits and frozen vegetables compiled by the National Association of Frozen Food Packers for the years 1942 through 1946 offers interesting data on the growth of this industry during the war years. The totals are based on reports from individual packers.

Production of Frozen Fruits, 1942 to 1946
(In millions of pounds)

Product	1942	1943	1944	1945	1946
Blackberries	8.2	8.3	16.2	21.5	19.8
Blueberries	1.7	2.7	5.0	7.8	10.2
Boysenberries	2.1	1.7	4.2	7.1	10.9
Gooseberries	0.6	1.2	1.6	1.6	1.4
Loganberries	2.7	1.3	3.1	2.5	3.0
Black Raspberries	6.2	5.4	5.6	3.5	5.5
Red Raspberries	14.2	14.6	13.1	13.3	23.9
Strawberries	63.8	29.8	34.8	36.9	78.1
Youngberries	2.1	1.2	2.5	2.6	1.8
Cherries, Red Sour	41.8	23.0	55.1	16.1	88.1
Currants	3.4	2.6	4.8	2.7	4.2
Apples and Applesauce	15.1	27.8	52.4	93.0	78.3
Apricots	5.3	10.0	42.6	65.2	43.6
Peaches	13.8	17.0	45.6	103.6	65.1
Prunes	2.9	22.1	18.1	18.4	14.1
Miscellaneous Fruits	10.8	18.5	19.2	34.5	75.4
Total	194.6	187.3	323.9	430.2	523.3

Pack of Frozen Vegetables, 1942 to 1946
(In millions of pounds)

Product	1942	1943	1944	1945	1946
Asparagus	5.8	9.6	12.3	20.6	28.3
Beans, Green and Wax	13.8	24.5	23.8	31.5	41.0
Beans, Lima	29.4	20.9	29.5	28.5	50.1
Broccoli	3.2	4.9	6.8	11.7	25.8
Brussels Sprouts	3.4	4.8	4.9	6.6	13.5
Carrots	1.0	2.3	0.9	6.1	9.1
Cauliflower	1.2	2.5	4.8	7.4	13.2
Corn, Cut	9.4	21.4	21.0	25.6	42.4
Corn-on-Cob	1.8	0.8	0.6	0.4	2.3
Peas	59.1	70.3	79.2	103.8	140.6
Peas and Carrots	1.1	1.6	2.1	5.3	7.2
Rhubarb	0.8	3.6	4.4	6.9	10.6
Spinach	16.6	24.6	31.9	36.7	38.2
Succotash	0.1	0.2	1.1	1.8	3.4
Pumpkin and Squash	2.6	8.3	10.0	7.4	10.0
Miscellaneous Vegetables	3.3	7.3	3.7	7.9	14.3
Total	152.5	207.9	237.1	308.0	450.0

Rules Promulgated For New Sugar Users

RULES have been announced by which new manufacturers of sugar-using products may secure their sugar allotments. The Department of Agriculture's Sugar Rationing Administration has laid down the procedures for new sugar users, which generally follow the program for veterans, in effect for some time.

Firms or individuals, who now have a sugar base or who have had sugar-using establishments under rationing, are not eligible for new user allotments. Neither will sugar be allocated to new businesses for production of products intended for industrial or institutional use rather than for consumer use.

The old hardship formula is all that is open to old sugar users who want more sugar to make a new sugar-using item. Processors will find the hardship excuse as difficult to handle under the new regime as it was under OPA. Best chance for additional sugar is to prove an unfair competitive position.

Established businesses may be eligible for adjustments of their base period use on the basis of plant capacity on April 20, 1942, if their use of sugar happened to be below normal in the base period.

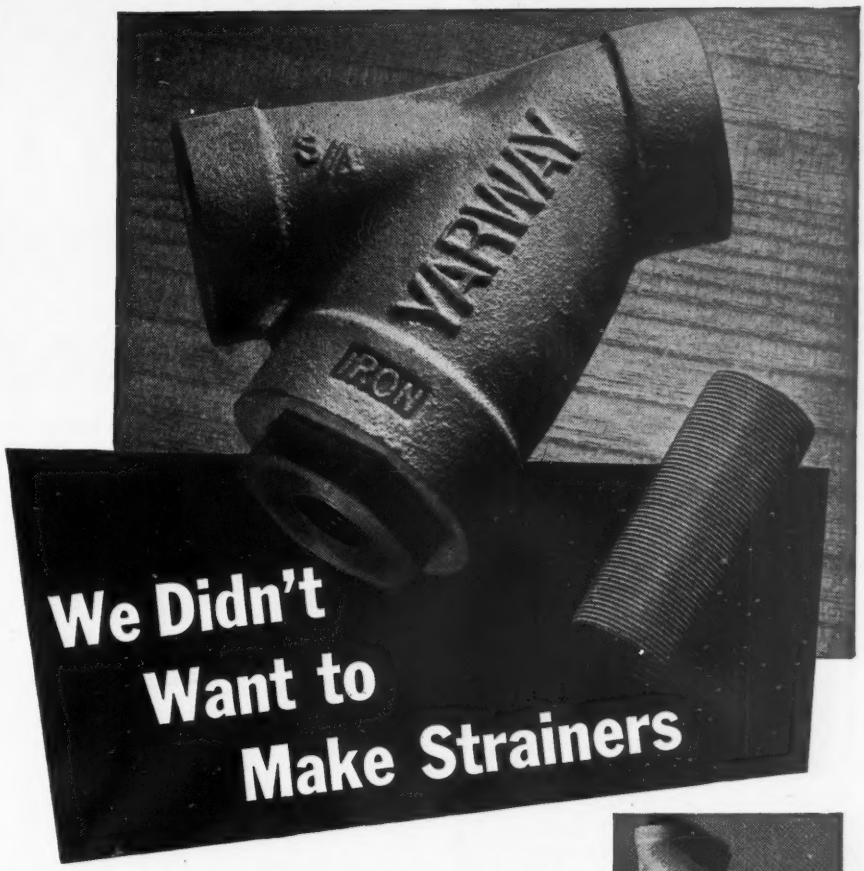
New users will receive their allocations from a 12,500-ton "kitty" to be made available each quarter by SRA. For revision of the rations of established users "sugar bases will be adjusted in addition to this amount (the 12,500 tons) to the extent that supplies available for such adjustments will permit consistently with other requirements and the maintenance of an effective national allocation and rationing program."

Program Arranged for World Microbiologists

THE INTERNATIONAL ASSOCIATION OF MICROBIOLOGISTS, holding its fourth international congress, in Copenhagen, Denmark, July 20 to 26, has arranged nine sectional meetings, which include programs on Dairy and Food, as well as Industrial Microbiology and Alcoholic and Other Fermentations.

The program for the dairy and food section includes sessions on Sour Milk for Therapeutic Purposes, Lactic Acid Bacteria in Silage, Food Poisoning, Dairy Bacteriology, Digestibility of Cellulose, and Beet Sugar.

Topics for the Industrial Micro-



We Didn't Want to Make Strainers

BUT we needed them for use with Yarway Steam Equipment and couldn't find any to suit us.

So we designed the *YARWAY Strainer.* Apparently a lot of other people were having "Strainer trouble" because the Yarway Strainers *purchased* in a few years now number *many thousands.*

Why don't you look into this better Strainer for your money? Buy one from your supply house (over 100 Mill Supply Houses now have them).

Cadmium Plated for protection against corrosion and for better appearance.

Examine its *high grade Monel woven wire screen* that stops dirt—lets condensate or other fluids flow freely.

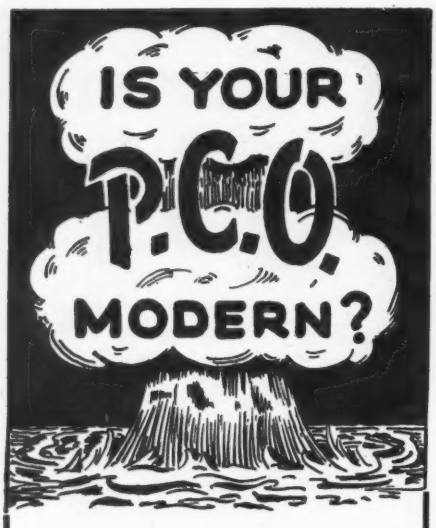
Notice the removable blow-off bushing. Screen and bushing come out together—go back together, *automatically aligning.*

Six standard sizes from ½" to 2" for pressures to 600 lb.

See your Mill Supply-House or write for Bulletin S-201

YARNALL-WARING COMPANY
127 Mermaid Ave. PHILADELPHIA 18, PA.

YARWAY STRAINERS



THEY CONTAMINATE FOOD, DESTROY PROPERTY, UNDERMINE GOOD WILL AND SPREAD DISEASE!

You wouldn't deliberately contribute to the welfare of Rats, Mice, Roaches and other Insect Pests. Yet, unwittingly, you may be providing them with the food and shelter they need with which to carry on their destructive work.

MODERN PEST CONTROL SERVICE OFFERS POSITIVE CONTROL

With chemicals unheard of five years ago and new methods the modern pest control operator is prepared to solve your problem intelligently.

- POWERFUL NEW CHEMICALS.
- HIGHLY SKILLED-TRAINED OPERATORS.
- A QUARTER CENTURY OF EXPERIENCE (VOGEL-RITT).

IS YOUR PEST CONTROL SERVICE MODERN?

Let us check. With cost of obligation, we will make a survey of your premises and submit a detailed report of our findings. Our report will show:

- SOURCE OF INFESTATION.
- CAUSE.
- INFESTED AREA.
- CONTRIBUTING FACTORS THAT MAY BE EASILY CORRECTED BY YOU.
- SERVICE THE MODERN PEST CONTROL OPERATOR SHOULD RENDER.

YOU SHOULD HAVE OUR FREE REPORT

If your pest control service is modern, you will be happy to know it. If it isn't, you may want to employ our service. Phone LOcust 7-1828 or return the attached card. Remember, there is no cost, or obligation.

VOGEL-RITT
INCORPORATED

PIONEERS IN PEST CONTROL

2212 Chestnut Street, Dept. A
Philadelphia

CONTACT OUR NEAREST BRANCH OFFICE:

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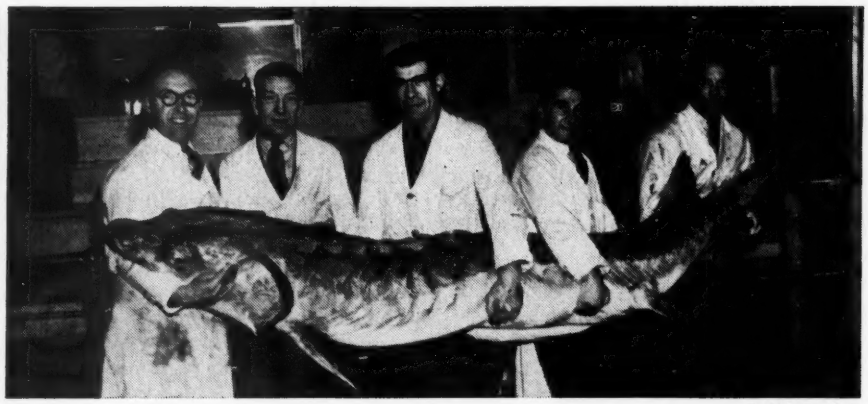
BALTIMORE
233 St. Paul Place
CHICAGO
174 W. Jackson Blvd.
CINCINNATI
123 E. Court St.
COLUMBUS, OHIO
253 S. High St.
DETROIT
6432 Cass Avenue
HAGERSTOWN, MD.
314 W. Washington Street
HARRISBURG, PA.
2107 N. 6th Street
TRENTON
128 Calhoun Street
VINELAND, N. J.
7th and Landis Avenue
ATLANTA
No-Vex Co. of Atlanta
596 Peachtree St. N. E.
MACON, GA.
No-Vex Co. of Macon
454 First Street



British Combine

IT'S THE HONEST TRUTH

These five witnesses can testify that this 400 lb. royal sturgeon was caught. They know because they had to carry it into a fish market in London's Oxford St., last month.

biology include: Butanol Fermentation, Industrial Production of Ethanol, Methane Fermentation, Production of Fat by Fermentation, Industrial Production of Butanol and/or Acetone by Fermentation, Citric Acid Production by Fermentation, Acetic Acid Bacteria as Contaminants in the Fermentation Industries, Production of Yeast, Microbiology of Brewing, Influence of the Oxidation-Reduction Potential on the Microbiology of Beer, Nitrogen Nutrition of Yeast in Wort, and Experiments on Bottom Fermentation.

Food Storage Experts Invited to London

THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS has asked its 47 member governments to send experts to meet in London on August 4, to consider methods of reducing losses due to infestation of stored foodstuffs. The meeting, expected to last about a week, follows up the study made by the Export Committee on Destruction of Food in Storage by insects, mites, rodents, and mold fungi, which met in Washington, May 10, 1946.

It is well known that annual losses of stored food through infestation reach serious proportions. Under adverse climatic and unsatisfactory storage conditions, the annual loss of grain, pulses, and oil seeds due to infestation may run much higher than 10 percent in some countries. Even in countries with well developed technological services, losses run from 3 to 5 percent. Figures based on prewar years estimate grain losses (excluding pulses) in Mexico are close to 12 percent. Grain losses (including rice) in China and India are estimated at 7 and 5 percent, respectively. Statistical information on world losses is incomplete, but if it runs to the average of 5 percent of annual world production, it would represent about one-half of the amount of these foodstuffs entering world trade.

Cheese Hearings

AFTER two and a half weeks of F&DA discussion of domestic natural cheeses, a recess was taken until May 12. At that time the consideration of process cheeses and foreign natural cheeses was to begin. No forecast as to the duration of these hearings could be made during the recess.

"TOUGH JOB" DEADLINE

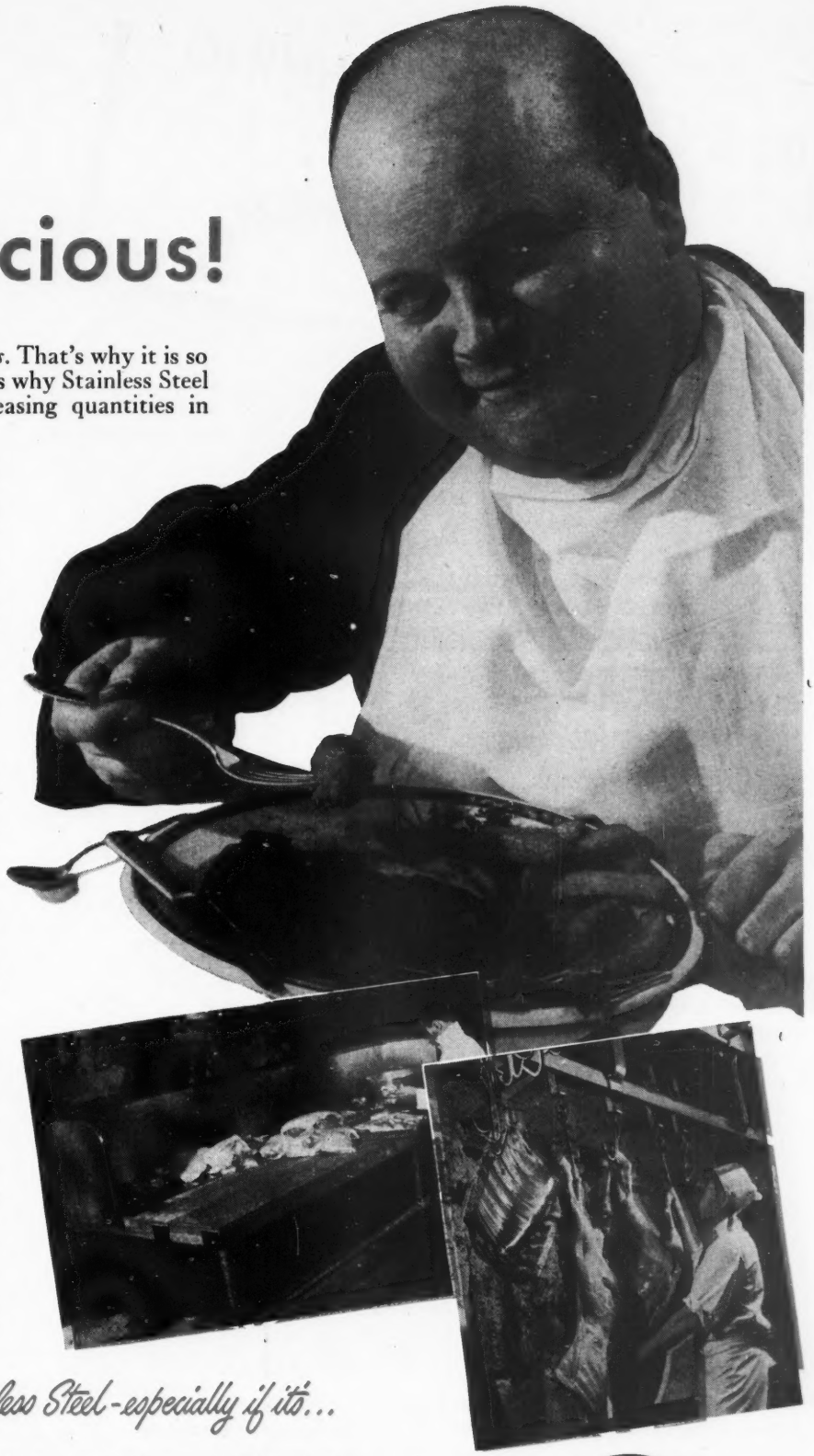
FOOD INDUSTRIES' offer of $100 for the three best articles on difficult, mean or unpleasant jobs in the food plant closes July 1, 1947.

This offer is open only to subscribers of FOOD INDUSTRIES or employees of companies where a company subscription comes to the plant where they work. In addition to $100 each for the three best discussions, we will also pay regular author's rates for all other such articles on difficult or unpleasant jobs that we publish, even if they don't win the prize rate.

Articles must describe a job in a food plant that you or somebody hates to do, then must tell why you or your subordinates hate it, next how you have found it can be done easier, or else what could be done, or should have been done to make it easier, or more pleasant. Be sure also to send photos or diagrams with your article so that somebody else can learn how to do the same job more easily. You can tell it in from 200 to 2000 words. This ought to be a cinch for engineers, mechanics, maintenance men, foremen, or "mopupuses." But technologists, superintendents and production managers also have mean jobs—even presidents have their pet hates. Here's a chance to help the other fellow.

The editors are the judges and their decision is final. Address your letter to the "Tough Job Editor."

D-e-e-e-licious!



The better food tastes—the better it *sells*. That's why it is so important to safeguard flavor, and that's why Stainless Steel equipment is being used in ever-increasing quantities in meat packing plants.

For Stainless Steel – strong, tough, long-lasting and permanently good looking—has the outstanding advantage of being inert in the presence of meat juices. Because it imparts no metallic taste to meat products, natural flavor is unaffected. Because its dense, hard surface gives no toe-hold to germs or bacteria and can so easily be kept spotlessly clean, it prevents contamination. Because it eliminates discoloration it avoids de-grading.

Protected by Stainless Steel in tables, benches, scales, pans, conveyors and cooking equipment, the goodness of your product—its wholesomeness, purity and above all, its taste—are maintained at top perfection. Waste is avoided, plant efficiency is improved.

We do not manufacture packing plant equipment, but we do supply leading makers of such equipment with the finest Stainless produced—U·S·S Stainless Steel.

This *perfected* Stainless is so uniform in composition, in finish and fabricating qualities that it allows the widest latitude in design and permits the use of the most advanced manufacturing techniques. The result—equipment that will deliver the utmost in performance. If you want that kind of equipment, make it a point to specify "U·S·S Stainless Steel" on your next order to your equipment manufacturer. It adds nothing to the cost—it can add years of greater satisfaction.

Remember-nothing equals Stainless Steel-especially if it's...

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

USS STAINLESS STEEL UNITED STATES STEEL

7-382

UNITED STATES STEEL AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago & New York
CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh & Chicago · COLUMBIA STEEL COMPANY, San Francisco
NATIONAL TUBE COMPANY, Pittsburgh · TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham
UNITED STATES STEEL SUPPLY COMPANY, *Warehouse Distributors*, Chicago : UNITED STATES STEEL EXPORT COMPANY, New York

IN EVERYDAY CLEANING—
101 Different Uses
for a Farquhar
Hi-Pressure Cleaning Unit

designed
To Save Time
and Cut Costs

For daily cleaning of hard-to-get-to places, there are 101 different uses for Farquhar Hi-Pressure Cleaning Units . . . uses that mean greater savings of time and money for you.

Waste accumulations on vats, belts, coolers, tanks, floors, etc. are dislodged easily and swept away quickly by means of a high velocity jet spray of hot or cold water at pressures up to 500 lbs.

Available in two sizes, Farquhar Hi-Pressure Cleaning Units do a thorough cleaning job day in and day out—in less time . . . at less cost. For the cleaning units you need, contact Farquhar today.

Other Equipment for the Processing Field

HYDRAULIC JUICE PRESSES • SPRAY-COOLERS • TRIMMING TABLES

SPECIAL MACHINERY FOR THE PROCESS INDUSTRIES
Conveyors • Hydraulic Presses • Farm Equipment

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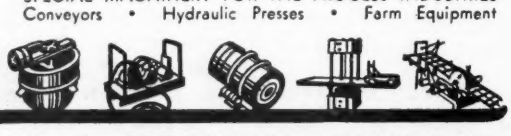


SPECIAL MACHINERY DIVISION
A. B. FARQUHAR COMPANY
1290 NORTH DUKE STREET YORK, PENNSYLVANIA

DISTRIBUTION

Reduce Grain Exports In June Allocations

JUNE export allocations of 1,002,000 long tons of wheat, flour (in wheat equivalent), corn, grain sorghums, oats, and barley have been announced by the Department of Agriculture. This is a total of approximately 39,609,000 bu. Allocations for May (including emergency quotas) totaled 1,413,000 long tons, or about 55,000,000 bu.

Department officials stated that the June allocations have been reduced so as to (1) protect year-end domestic supplies of wheat and flour, and (2) to hold remaining allocations of other grains for the 1946-47 year as close as possible to a quantity that can actually be exported by June 30.

The Department also announced that the Production and Marketing Administration already has bought most of the flour needed to cover its portion of the June program.

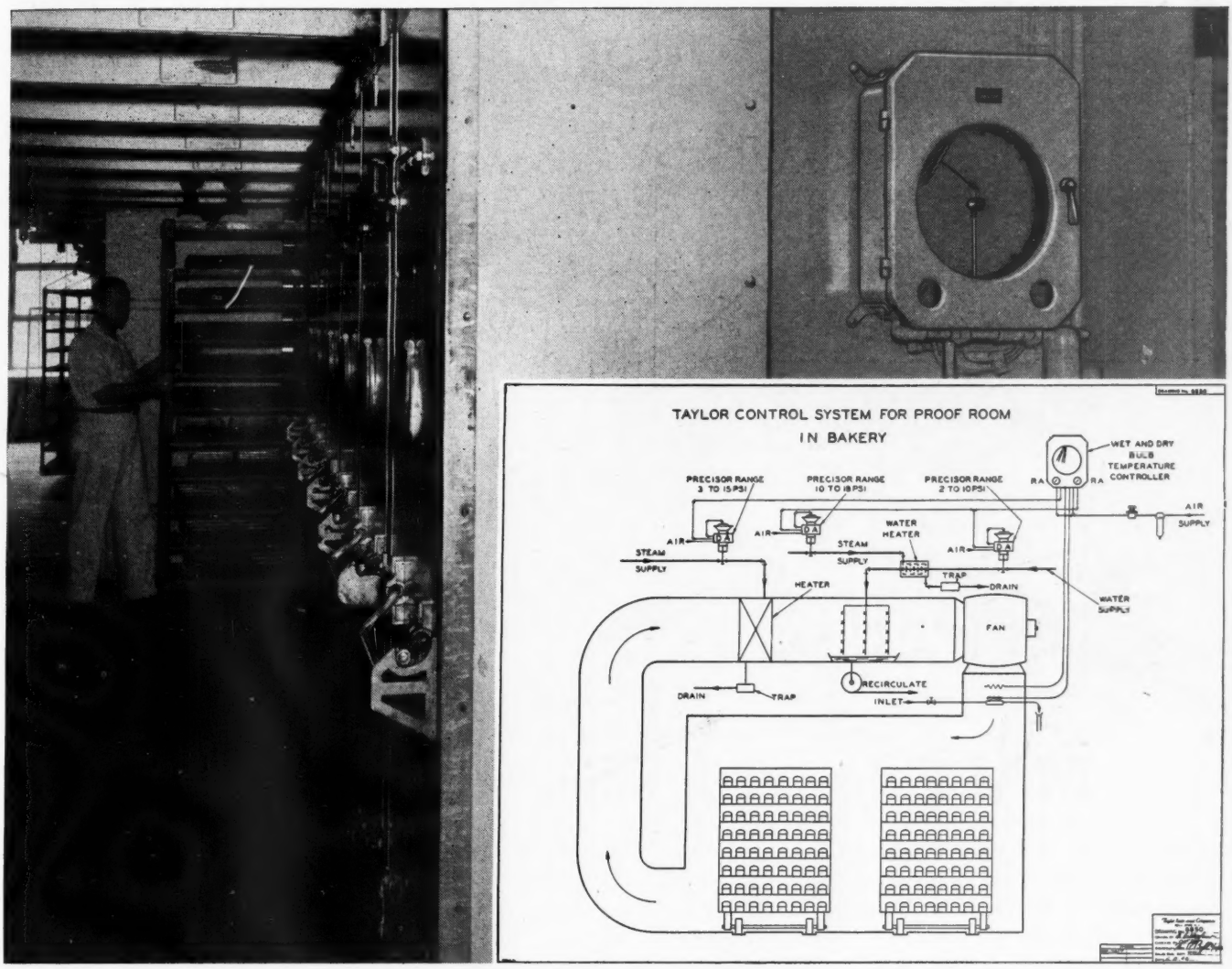
Under the June allocations the Department will supply: (1) All flour for U. S. and U.S.-U.K. occupied zones and for Austria; (2) all wheat excepting quantities allocated to Mexico; (3) all corn for U. S. and U.S.-U.K. occupied zones and for Austria; (4) all barley; (5) all oats and grain sorghums for occupied zones.

Urge Fair Trade Rules For Trademarked Items

"AS a substitute for experiments for stopping inflation," the American Fair Trade Council has recommended that "all trademarked or otherwise identified consumer products be brought at once under Fair Trade, as authorized by the Miller-Tydings Federal Enabling Act." The Council is a nationwide organization of manufacturers of branded consumer products.

John W. Anderson, president of the Council contends, "The most effective action for the protection of the consumer against unreasonably high prices would be to strengthen Fair Trade laws to require that all manufacturers of qualified trademarked consumer products determine both the wholesale and retail prices at which those products must be sold. Present Fair Trade laws merely permit—do not require—such action. Manufacturers have most to lose by exorbitant pricing of their products. Exorbitant pricing destroys sales. Without sales

No trouble raising the dough here!



ONE reason why there's no dough trouble in the proofing room (photo) at the U. S. Bakery, Portland, Oregon, is that they keep close tabs on temperature and humidity. And that's where Taylor steps into the picture!

Up in the right hand corner is the Taylor Fulscope Recording Wet-and-Dry Bulb Controller which automatically maintains wet-and-dry bulb temperatures at the desired level. With this Fulscope on the job there's no danger of crust forming because air is too dry, or of dough not rising properly or sticking to pan because air is too moist. It keeps incoming air *just right!*

Here's how the system works. The Fulscope operates a diaphragm valve controlling the right amount of steam to be used to maintain the correct temperature. It also controls a valve in the spray water line to add the proper amount of moisture to incoming air. In addition, this instrument gives you a permanent, minute-by-minute record of wet-and-dry bulb temperatures. This is just one example of the way Taylor Instruments can help you beat competition by keeping *quality up* and *costs down.* Whatever instruments you need, call your Taylor Field Engineer. Or write on your letterhead for Catalog 900 to Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

MADE for each other

That's the way it is with Wyandotte Cleaners. There's one of them *especially* made for each type of cleaning job you may have.

For general cleaning of all types of food-processing equipment, Wyandotte G.L.X.* is effective and economical. This modern, soapless cleaner penetrates greases and solids, cleans rapidly and rinses freely, leaving stainless steel and other surfaces bright and lustrous. It is recommended for use in hard water, as well as in water of average hardness.

Stains and scale deposits on equipment can be quickly removed with Wyandotte S.R.-10.

Wyandotte Citrifoam is a readily soluble compound used for washing fresh fruits and vegetables. Sudsy but containing no soap, it has remarkable cleaning and lubricating action.

As a germicidal rinse for all plant equipment, after washing, Wyandotte Steri-Chlor* insures greater protection and increased sanitary control. It is invaluable, too, as a germicidal rinse for workers' hands.

If you want the best results in your cleaning operations, it will pay you to call in your Wyandotte Representative. His skill and experience—backed by exhaustive Wyandotte research—are yours for the asking.

*Registered trade-mark

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 88 CITIES

the manufacturer's heavy investment in buildings, machinery and other facilities becomes worthless. The 45 States having Fair Trade laws therefore wisely have relied upon the manufacturer of branded products to protect the consumer from unfair prices."

Anderson pointed out that "Manufacturers of popular trademarked products know well that wherever wholesalers and retailers mark up any such product unreasonably the public turns to some other product.

"Manufacturers who have chosen to sell their branded products under Fair Trade contracts requiring the maintenance of specified retail prices are the only manufacturers who have been able to protect the public against gouge," said Anderson.

"Fair Trade laws by their terms can be applied only to products sold in open competition with other products of the same general class. In a buyer's market, retail monopolists use popular trademarked products, unless protected by Fair Trade, as consumer bait at loss leader prices. That destroys the interest of smaller retailers, who abandon the product. The heavily financed price cutter then forces the manufacturer to further reduce prices in order to stay a little longer in business. Thereupon the distressed manufacturer, to reduce his costs, is compelled to sacrifice first that top margin of quality that has given the product its greatest measure of value to the consumer. Thus, in a buyer's market, the 'cut price spiral' may be used to force the 'quality squeeze.' Wages are depressed. The consumer gets less for his dollar, and finds that dollar

JUNE DAIRY MONTH
Just so the dairy industry will know that we are cooperating, too, we run this illustration of the industry's official poster, to be displayed during June.

SALES WEDGE

Where taste appeal is a sales appeal, Ethavan* is often used to drive a wedge into a profitable market.

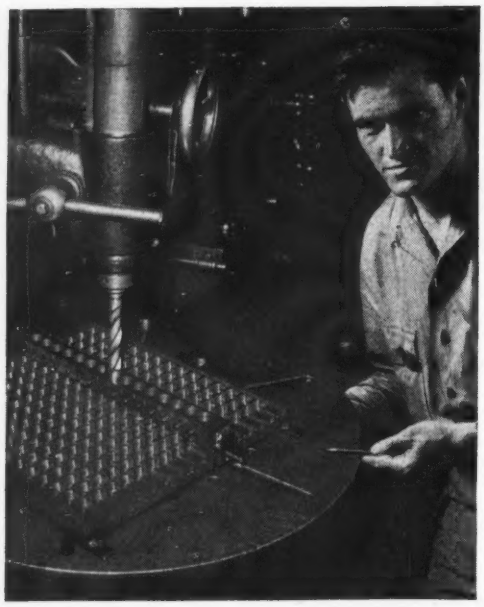
There are many reasons for preferring Ethavan, Monsanto's Ethyl Vanillin. It has a more distinctive flavor. Its aroma is more pronounced, more intriguing, more pleasing. And, it lasts — even when subjected to high or low temperatures in processing, the individuality of Ethavan displays unusual "staying" power. Three times stronger than vanillin, Ethavan is also more economical to use.

MONSANTO
CHEMICALS AND PLASTICS

Specify Ethavan in your vanilla flavorings. Samples are available. Contact the nearest Monsanto District Sales Office, or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri . . . District Sales Offices: New York, Chicago, Boston, Detroit, Cincinnati, Charlotte, Cleveland, Birmingham, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Ltd., Montreal. *Reg. U. S. Pat. Off.*

SERVING INDUSTRY . . . WHICH SERVES MANKIND

40% Less Machining with **E-Z-CUT PLATES**



. . . in Stock for Immediate Shipment

Especially well suited for die bases, jigs, and other applications where considerable machining is involved, E-Z-Cut plates machine smoothly at higher speeds, with less tool wear. Other E-Z-Cut advantages: They case harden to extreme surface hardness with even gradation of carbon from case to core. Weld easily. To save with E-Z-Cut, call, wire or write the nearest Ryerson plant for quick service.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston, Los Angeles.

Bars • Structurals • Plates • Sheets
Mechanical Tubing • Boiler Tubes
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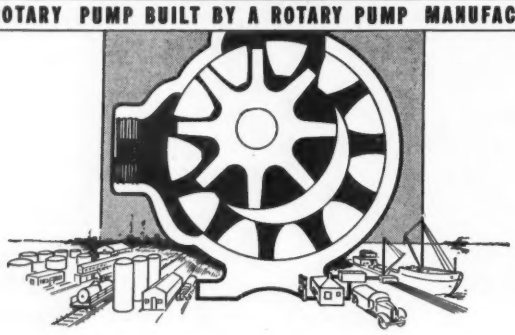
RYERSON STEEL

VIKING

The ROTARY PUMP BUILT BY A ROTARY PUMP MANUFACTURER



Viking Rotary Pumps are no side-line business. They are no fill-in. Making Viking Rotary Pumps is our one and only job. That is why you get so much from a Viking Pump.

It's an exclusive Viking product . . . in design . . . in production . . . in service. Every effort is extended toward the betterment of this one product. Every design is based on a "gear-within-a-gear—2 moving parts" principle. All production is concentrated on this one style pump. Service is simplified by the same means.

Discover for yourself this outstanding rotary pump. Write today for free folder Bulletin Series 100E. It will be sent to you by return mail.

See Our Catalog In SWEETS

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

harder to get, unless protected by Fair Trade. In an inflationary seller's market Fair Trade again protects the consumer—against extortion—and protects the manufacturer against being high-priced out of business."

Cherry-Burrell Sets Prices for 4 Months

THE CHERRY-BURRELL CORP., Chicago, manufacturers of dairy equipment, announced recently that it was joining the growing ranks of manufacturers offering guaranteed prices on their products. The company's representatives have been authorized to quote set prices on equipment scheduled for shipment within four months.

This action marks another advance in the establishment of stable prices in the food equipment field. Although still faced with further wage negotiations and fluctuating prices of raw materials, Cherry-Burrell is, in effect, abandoning the escalator clause based on price at time of shipment. They also express the hope that no further advances in price will be forced upon them.

Orange Concentrate Used in Dispenser

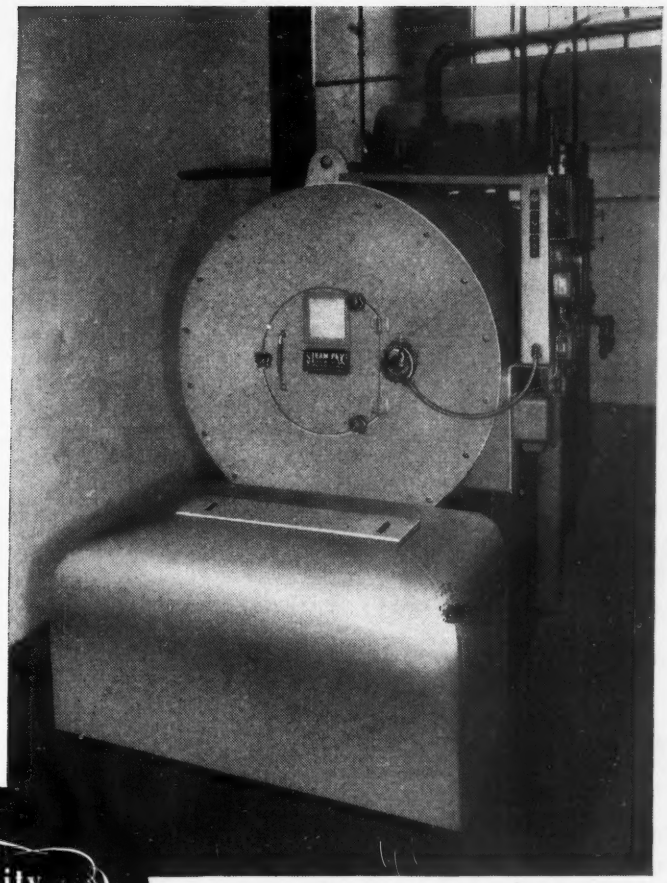
AN opening wedge in the popular-priced cold drink business has been made by the Florida citrus processors with the Automatic Canteen Corporation of America ready to dispense frozen orange concentrate from its machines in at least twenty key retail centers.

The Florida Citrus Commission has been working with the Chicago firm for some time to develop a market for orange frozen concentrate and the results of a six-week test run with one machine in Chicago showed that the orange juice outsold other cold drinks in the same machines two to one.

The test used the 42 deg. Brix concentrate, requiring one and one-eighth ounces of concentrate in liquid state to three and three-eighths ounces of tap water, the resulting drink selling for five cents.

The commission stated that plans are to increase the drink to six ounces to retail for 10 cents. This would assure a more constant and favorable price for the concentrate.

Recently the commission at Lakeland held a meeting with representatives from Vacuum Foods, Inc., Florida Frozen Fruits, Inc., Bruce's Juices, Sperti Citrus, Inc.,



Steam - Pak Generator Model SPH-30 installed at Eisenhart's Dairy, York, Pa.

priceless quality
precision combustion

CLEANLINESS

In dairies, and many other modern industries, cleanliness is *imperative.* The progressive operator realizes that his steam plant and boiler room can contribute most to that objective.

Eisenhart's Dairy in York, Pa., replaced its coal-fired boiler with a 30 hp. high pressure *Steam-Pak Generator* burning No. 5 oil . . . eliminating entirely the dust-ash hazard.

The *Steam-Pak Generator,* a packaged oil-fired boiler, answers the cleanliness problem for the boiler room through its modern design and efficient operation. The precision combustion of the *Steam-Pak Generator* eliminates the smoke problem.

Steam-Pak Generators are available for high or low pressure steam in 15, 30, 50, 75, and 100 hp. sizes. They are designed for use with light or heavy oils (Nos. 3, 5, or 6). Industrial Division, York-Shipley, Inc., York, Pa.

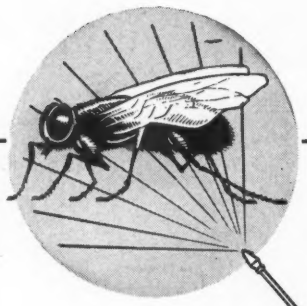
Write for *Steam-Pak Generator* Catalogs ID-47-8K and ID-46-1K.

YORK-SHIPLEY

Oil-Fired Equipment for Industry

AMERICA'S MOST COMPLETE LINE

IN CANADA . . . SHIPLEY CO., LTD., TORONTO



GET RID OF INSECTS

with Virginia

LETHALAIRE©

LETHALAIRE, Virginia's deadly new aerosol insecticide, is made especially for large users. Lethalaire kills many different insects that plague public places, restaurants, factories, homes. It comes in a portable 5-lb. container-applicator that insures its correct and economical application.

A turn of the handwheel releases a circulating, self-propelled mist of fine insect-killing particles that remain suspended in the air for as long as half an hour. Each cylinder holds enough Lethalaire for 750,000 cu. ft. of space for flies . . . 1,250,000 cu. ft. for mosquitoes—enough for 125 applications for average use in a room 20′ x 30′ x 10′. Because the Lethalaire precision-engineered nozzle is scientifically designed, it generates a spray of correct particle sizes and meters the flow, preventing waste and insuring quick knock-down and high insect mortality.

Lethalaire is also available in a permanently installed system that will give you automatic insect control at the flick of a switch. Remember, wherever there are insects, the problem is BIG. Put your problem up to us and we'll show you what Lethalaire can do for you. Mail the coupon today for further interesting information about Lethalaire. A few territories are still open for dealers who call direct on users.

VIRGINIA SMELTING COMPANY FI-6
West Norfolk, Virginia

Please send me more information about
☐ The 5-lb. Portable Container-Applicator
☐ The Lethalaire Solenoid System

Name_____

Street_____

City _____ Zone No._____

VIRGINIA Chemicals

WEST NORFOLK • NEW YORK • BOSTON • DETROIT

COFFEE DIRECT

For the first time since the war, a major shipment of coffee beans was unloaded directly from ship to plant, in Hoboken, a month ago. During the war all coffee was handled from lighters because of restrictions governing single unloading points for all shipping.

Pasco Packing Co., Juice Industries, Florida Citrus Canners Cooperative, and Snively Groves, relative to the proposition of the Automatic Canteen Corp. and the results of the tests.

Export Sugar Control Shifted to Commerce

AUTHORITY to control export of sugar and sugar containing products of certain classes has been delegated to the Office of International Trade in the Department of Commerce, by the Secretary of Agriculture, in accordance with the Sugar Control Extension Act of 1947. Definitions of sugar, sirup, molasses, and sugar containing products, and the detailed procedure for complying with the regulations, are contained in the Federal Register for April 25. Export licenses issued by the Office of International Trade prior to April 1 are valid until the expiration date thereof, according to that proclamation.

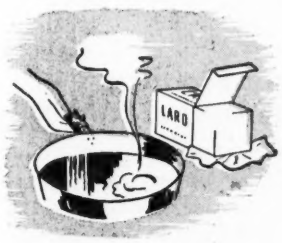
Appeals and other communications concerning sugar exports should be directed to the Sugar Branch, Production and Marketing Administration, United States Department of Agriculture, Washington 25, D. C.

Court Upholds Right To Golden Trademark

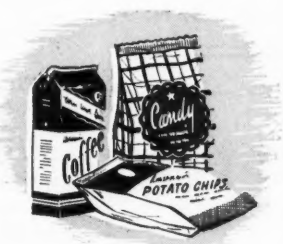
PILLSBURY MILLS' registered trademark "Golden Bake" for a soy pancake flour was held to have been violated in a recent Circuit Court of Appeals decision, reversing a lower court decree. The lower court had found in favor of Soy Food Mills in its use of the trademark "Golden Soy Griddle Mix."

Package Craft by Rhinelander

Ready Mixes for Pie Crusts, Biscuits and Muffins assure kitchen triumphs to the greenest bride. A few years ago these clever products didn't exist nor did the kind of packages that made them possible—many developed by Rhinelander.



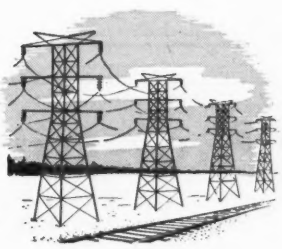
A Pound of Lard is a pound of unalloyed greasiness calling for a better package than existed until Rhinelander produced LARDPAK—a paper of unbelievable grease resistance. Maybe you have a baffling grease problem this super paper can lick.



Simple, Cheap and Wondrous things are modern paper bags. They can protect almost anything Rhinelander G & G Task Papers* are used to render bags: greaseproof, moisture-tight, liquid and sift-proof, heat sealing and wet strong.

Rhinelander G & G Task Papers* laminated to paper board now enable low cost cartons and cans to do jobs once restricted to tin and glass. These greaseproof, moisture-tight units have opened new fields of merchandising.

A 100% Moistureproof Material *will not* make a moistureproof package *unless* all apertures are closed. Heat sealing is the speedy, safe way to close all seams and overlaps. Rhinelander lacquered Task Papers pioneered this art.



Density of Formation, special dielectrical properties, moisture and grease resistance, have found for Rhinelander G & G Task Papers* many electrical applications. Typical examples: wire and cable insulation, coil winding, condenser construction, packaging of delicate parts.

Glassine and Greaseproof—the functional papers that do so many tough jobs well.

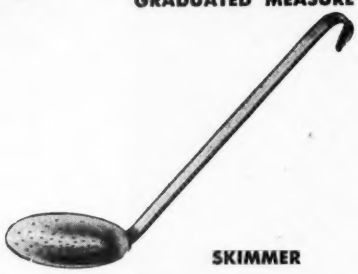
IN THE LAND O'LAKES • MILLS AT RHINELANDER, WISCONSIN

TERRISS SEAMLESS STAINLESS STEELWARE

RECTANGULAR TRAY

GRADUATED MEASURE

MIXING BOWL



SKIMMER

This Stainless Steelware is completely sanitary. There are no seams or crevices to catch dirt or leak. Polished inside and outside.

CONSOLIDATED
SIPHON SUPPLY CO., INC.

Dept. F, 22-24 Wooster St. New York 13, N. Y.

Steinlite Moisture Tester
IDEAL FOR
PRODUCTION CONTROL

The Steinlite electronic moisture tester is fast, accurate and easy to use.

Steinlite No. 105E is designed for testing processed material such as dehydrated vegetables, nuts, cocoa, and other special products. It is perfectly adapted for practically an instantaneous moisture test for production control purposes. A test can be completed in one or two minutes.

As each step in the process progresses, the moisture may be checked. The instrument can be furnished with a moisture test range from approximately 1% to 35%. It is calibrated against the established laboratory method for the particular material and is guaranteed to check within .25 of 1% of the method against which calibration was made. Sold on free trial basis. No money down. Write for complete details.

734 CONVERSE BUILDING

CHICAGO 6, ILLINOIS

SEEDBURO EQUIPMENT COMPANY

RAW MATERIALS

Peanut Price Support Set for 1947 Crop

THE DEPARTMENT OF AGRICULTURE recently announced the farm price of 1947-crop farmers stock peanuts will be supported at 90 percent of parity as of July 15, 1947, the beginning of the marketing year.

Prices will be supported by Commodity Credit Corporation loans and purchases. Purchase and loan values by type, sound mature kernel content, and quality, based on historical differences in value, will be announced after the July parity price has been determined.

Loans will be available to producers until January 31, 1948. Purchases will be made from producers until June 30, 1948. Officials stated that purchases will be made only to maintain prices or to provide markets. It is expected that any purchases will be made through peanut grower cooperative associations located at Franklin, Va., Camilla, Ga., and Gorman, Texas.

The 1947-crop support program is essentially the same as the 1946 program.

Farm Labor Program Extended in New Bill

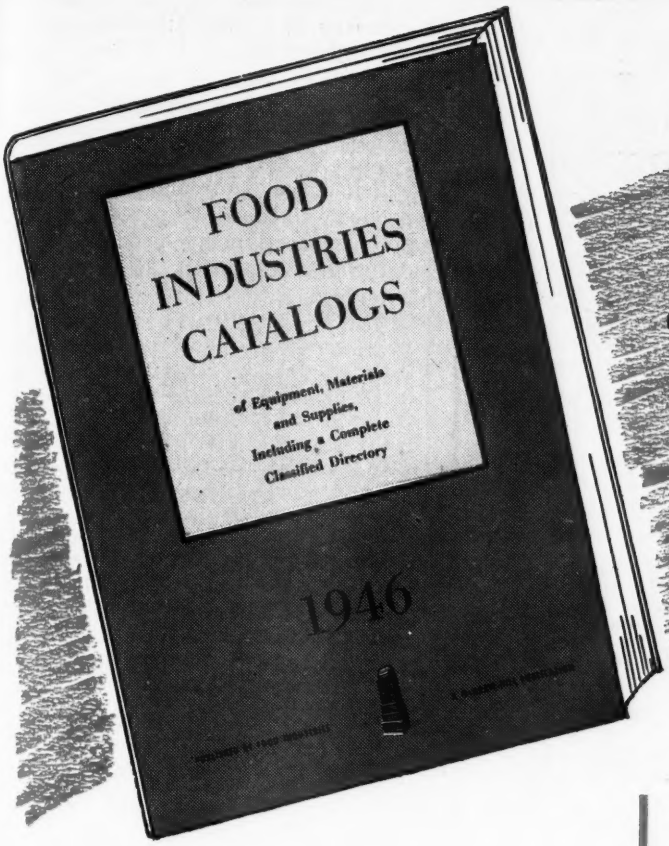
SCHEDULED to expire June 30, the government's program for importing farm labor is extended until the end of 1947, in a law passed by Congress and sent to President Truman for his signature.

Employment of production workers in the food industry, which dropped 37,000 in February, fell another 6,000 in March, according to preliminary figures released by the Bureau of Labor Statistics. However, the 1,055,000 employment for March was still 5,000 above March last year, and 123.5 percent above the 1939 average.

Including non-production workers, total employment in food was 1,483,000 in March. This was 2,000 below February and 29,000 below March, but 29,000 above March, 1946.

This falling off of employment is also reflected in the labor turnover rate. During February, more persons were severed from the payroll than were added. For every 100 employed, 6.2 left their jobs and only 5.3 were hired.

The turnover was particularly heavy in meat products, where 10.6 percent were dropped, and only 6.5 were added.



TO SAVE YOUR TIME . . .

. . . 184 LEADING MANUFACTURERS OF FOOD PROCESSING EQUIPMENT HAVE FILED THEIR PRODUCT DATA IN THIS *ONE* EASY-TO-USE BOOK.

FOOD INDUSTRIES CATALOGS is a dependable source of usually "hard-to-get" information on the machinery, equipment and supplies required for the maintenance or expansion of practically every food processing operation.

Here the *FACTS* needed to make a quick, intelligent selection are presented . . . here the emphasis is put directly on the application of the product to a food plant function—with "sales talk" at a minimum.

FOOD INDUSTRIES CATALOGS gives you reliably edited, up-to-the-minute specifications—in instantly accessible form—*and it's all between the covers of a single, handy volume.*

If you are responsible for specifying, requisitioning, or buying food plant machinery or supplies of any type—*look them up first in FOOD INDUSTRIES CATALOGS* . . . you'll do yourself a favor!

IF *you do not now receive FOOD INDUSTRIES CATALOGS, send request—giving title—on company letterhead to our New York office. Five dollars per copy.*

The product you are looking for is *Easier* to find in FOOD INDUSTRIES CATALOGS

Because Food Industries Catalogs includes concise data on important materials and equipment specifically related to food processing—*and nothing else.*

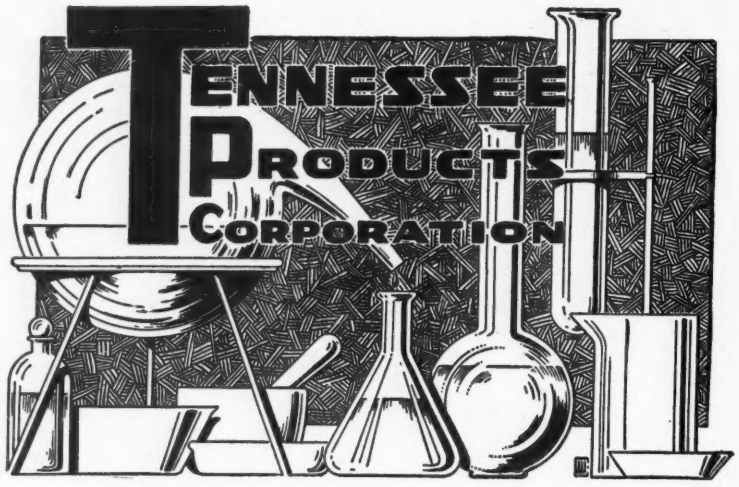
Because The Complete Directory of Manufacturers lists, by product, the names and addresses of all known makers of equipment, materials and supplies. (Bold face listings direct attention to the pages where detailed information on the products covered can be found.)

Because An Alphabetical Company Name and Trade Name Index provides you with another time-saving short-cut when you know the manufacturer, or brand name, of the product you want to order.

Because The Catalog Section gives you the facts you want—in the way you want them—when you are ready to make a buying decision.

McGRAW-HILL CATALOG SERVICE

330 West 42nd Street, New York 18, N. Y.



SODIUM BENZOATE U. S. P.

Flake ***Powdered***

Free-flowing, readily soluble

Produced by

TENNESSEE PRODUCTS CORP.

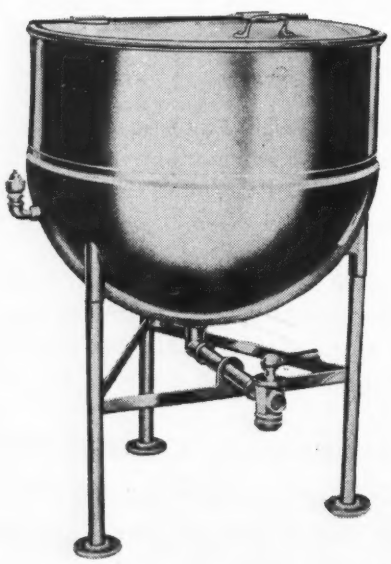
GENERAL OFFICES: NASHVILLE, TENN.

EASTERN SALES OFFICE: 350 FIFTH AVE., NEW YORK, N. Y.

CLOSE-OUT PRICES

ON

NEW STEAM-JACKETED KETTLES



60 GAL. WAS	80 GAL. WAS
$385.00	$475.00
NOW	NOW
$195.00	$245.00

WHILE THEY LAST!

LIMITED NUMBER!

ORDER TODAY!

Immediate delivery on NEW Stainless Clad Steam-Jacketed Cooking Kettles. 40 lb. Working Pressure. Complete with lid—safety valve—draw-off valve.

D. B. LEWIS MACHINERY CO.

3406 SOUTH AVALON • LOS ANGELES 11, CALIF.

The food canning and preserving industry is among 13 manufacturing classifications in which from 60 to 79 percent of the workers in the industry are employed under union contract.

This is reported in a BLS survey, which placed flour and other grain products in the 40-59 percent group, and confectionery products and dairy products in the 20-39 percent category.

The sugar industry was included in the top group of 22 industries that are more than 80 percent unionized.

Pea Yield Increased By Use of Nitrogen

INCREASES in yields of peas ranging from 300 to 700 lb. of shelled peas to the acre were obtained from 60 lb. of extra nitrogen applied to two different soils, in tests carried on by scientists at the Experiment Station, at Geneva, N. Y.

The tests were located in areas where peas frequently show the yellow color and stunted growth associated with a lack of nitrogen or calcium, and both soils were quite acid. One field received 550 pounds of a 4-12-4 fertilizer and the other 450 pounds of a 5-10-5 mixture.

World's Corn Crop Tops 5 Billion Bu.

THE world's corn crop in 1946-47, estimated at 5,410,000,000 bu., is the largest on record, according to the Department of Agriculture's Office of Foreign Agricultural Relations. At this figure it exceeds the 1945-46 crop by 8 percent, the 1944-45 crop by 2 percent, and the 1935-39 average of 4,729,000,000 bu. by 13 percent.

FOR HAT EATERS

It took a New York caterer to solve the problem for chronic promisers to "eat their hat, if . . ." While the idea is still in the fresh fruit stage, it would be a short jump to preserved fruits and vegetables.

NOW! Rayon IN DAYTON Thorobred V-BELTS

- MINIMIZES BELT STRETCH
- INCREASES FLEX STRENGTH
- INCREASES V-BELT LIFE

MINIMIZES V-BELT STRETCH—Low stretch, high tenacity *Raytex Fortified Rayon Cord, used in the neutral or strength section of Dayton V-Belts, is manufactured in continuous filaments . . . then twisted together to form cable-like cord, just as steel wires are twisted together to make a steel cable. That's why Raytex Fortified Rayon Cords practically eliminate stretch in the new Dayton Thorobred . . . which means fewer take-ups and less maintenance with every belt pulling its share of the load.

INCREASES FLEX STRENGTH—Because Rayon Cords are made of continuous filament, high tenacity Rayon, they combine high strength with greatest flexibility. This enables Dayton Thorobred V-Belts to flow smoothly around pulleys while transmitting power at maximum efficiency.

INCREASES V-BELT LIFE—Because Rayon Cords have greater strength in small diameters, Dayton Belt Engineers are now able to build a more compact, thinner neutral section of maximum pulling power. Thus, bending stresses are minimized which, in turn, lengthens the life of Dayton Thorobreds.

The new Dayton Thorobred V-Belts built with *Raytex Fortified Rayon Cord are now in production . . . will be available soon in all sizes. Write for free sample of this new cord and descriptive booklet.

DAYTON RUBBER • DAYTON, OHIO

Branch Offices: Atlanta • Boston • Chicago • Cincinnati
Cleveland • Dallas • Dayton • Detroit • Los Angeles
Minneapolis • New York • Philadelphia • St. Louis

V-BELT BUYERS! A leading mill supply house near you stocks Dayton V-Belts . . .
Look for the name in the yellow pages of your telephone directory

Dayton Rubber

THE MARK OF TECHNICAL EXCELLENCE IN NATURAL AND SYNTHETIC RUBBER

THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

THESE 6 TESTED TIPS

REMOVING MILKSTONE QUICKLY! When bacteria-harboring deposits of milkstone accumulate on pasteurizers, regenerators, vats, cans and tanks, apply Oakite Compound No. 36. Then note how thoroughly it softens such deposits so that only a light brushing and rinse are needed to effect complete removal.

DESCALING WATER-COOLED EQUIPMENT SAFELY: Circulating recommended solution of Oakite Compound No. 32 effectively removes heavy lime scale deposits from cookers, blanchers, supply pipes, spray nozzles, bottle-washing and can-washing machines, air compressor cooling jackets and similar water-circulating equipment.

MAY SAVE YOU MONEY ON

CONTROLLING BACTERIA AT LOW COST: To do this effectively, first clean equipment with a quick-acting Oakite cleanser, then spray or flush equipment with Oakite Bactericide solution. Because of its extremely low alkalinity, Oakite Bactericide kills more bacteria in less time . . . helps keep bug counts way down.

PREVENTING BOTTLE BREAKAGE: When your conveyor belts are treated with Oakite Composition No. 6, adequate bottle-slippage is provided, so that bottle breakage is reduced to a minimum. This material also prevents gummy deposits from defiling bottle bottoms. Oakite Composition No. 6 is extremely economical to use.

EQUIPMENT SANITATION

WASHING DELIVERY TRUCKS: The scientifically designed detergent action of Oakite Composition No. 70 thoroughly removes dirt and traffic film from truck bodies so that painted surfaces quickly look as neat as a new pin. Because it rinses readily, this widely-used shampoo leaves surfaces streak-free without chamoising.

EXPEDITING GENERAL EQUIPMENT CLEANING: Possessing effective detergent and emulsifying properties, Oakite quickly, thoroughly removes grease and dirt from processing equipment. Oakite cleaning reduces equipment out-of-service time to a minimum. It is an excellent cleaning-before-chemically-sterilizing detergent.

AND PLANT MAINTENANCE

To obtain further details on these and other specialized Oakite cleaning materials and methods, write for 24-page Oakite Digest offering 97 performance-proved suggestions for saving time, effort and money on all phases of plant maintenance and equipment sanitation. This manual will promptly be mailed to you **FREE** on request.

OAKITE PRODUCTS, INC., 36G Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE
REG. U. S. PAT. OFF.

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

McGRAW-HILL *World News*

Indian Principality Steps Up Sugar Output

HYDERABAD-DECCAN, INDIA—Shooting at a goal of becoming a food surplus area in the next few years, the princely state of Hyderabad, largest in India, has a 3,200-ton sugar plant on the way from England and has just contracted with Power Gas Corp., for construction of a 50-ton a day vegetable oil factory, which ultimately is to be enlarged to 100-tons a day.

Already an important Indian sugar producer, Hyderabad's state-owned plant at Bodhan in the Godaveri River basin, 120 miles north of this city, is crushing 1,400 tons of cane a day and producing between 3,000 and 4,000 gal. of power alcohol a day from the molasses residue. Both present and ordered equipment is from Mirlees-Watson, Glasgow.

Using the double-sulfitation process, the plant is one of the most successful in India for the cane from the surrounding plantations runs as high as 16 percent fiber content, supplying all fuel needs and leaving a surplus for utilization in rough paper and other fiber containing products.

China Rebuilding Export Egg Packing

SHANGHAI—The Chinese government has just approved a scheme that will start the rehabilitation of one of China's chief prewar export industries—the packing of refrigerated eggs.

In an open contract with the Refrigerated Egg Packers Association, the government will support the export of up to 2,000 tons of frozen eggs to Great Britain this year. From time to time, the Association will declare what tonnage they are willing to pack on a firm basis. The government immediately will pay the packers CN$9,000,000 for each ton declared. This money, amounting to an advance full payment, will be used to finance the purchase, transportation and processing of the eggs for shipment. In this way much of the risk which

In a Bridge—it's Engineering
In Seasoning—it's STANGE

In building a bridge, you want dependable engineering methods for permanence and safety. In seasoning a food product, you want Stange's modern, uniform, dependable method of incorporating natural spice flavors into your processed foods.

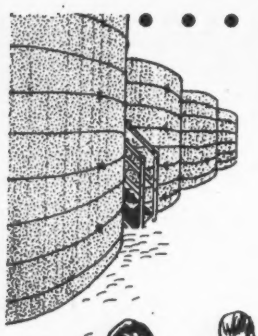
Every Stange Cream of Spice seasoning has ALL the essential oils and aromatic oleo resins of NATURAL spices in a concentrated, easy-to-use form—with all foreign matter and unsightly waste material discarded. It has the same degree of strength—it's instantly soluble—and it comes as an individual spice flavor, such as cinnamon, celery, pepper; or in premixed blends, such as apple butter seasoning, chili sauce seasoning, seasoning blends for packers of dehydrated soups, and seasonings for meat packers and sausage makers.

Ask STANGE to help you on any seasoning problem you may have.

42 YEARS OF SERVICE TO THE FOOD INDUSTRY

Stange's CREAM OF SPICE Seasonings

• WM J • STANGE CO • 2540 W. MONROE ST., CHICAGO 12, ILL.



FOOD PROCESSING EQUIPMENT *A Problem?*

Tidewater
RED CYPRESS

IS YOUR ANSWER!

A PROVEN FACT: Tidewater Red Cypress does not impart odor, taste, or discoloration to food with which it is brought into contact. This fact alone makes it ideal for such items as fermenting vats, processing tables, churns, pickle containers, etc.

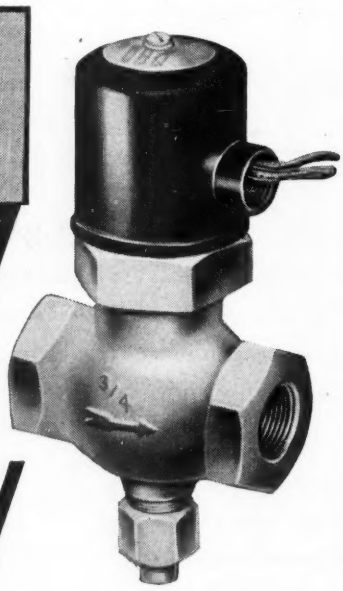
A PLUS VALUE: This outstanding wood also offers extraordinary resistance to deterioration when used under adverse conditions such as extreme dampness, heat, etc.

Tide Water Red Cypress "The Wood Eternal"

LET US HELP YOU. WE INVITE INQUIRIES CONCERNING ALL TYPES OF TANKS AND VATS — FULLY FABRICATED OR PARTIALLY FABRICATED

FLEISHEL LUMBER COMPANY
4230 DUNCAN • ST. LOUIS 10, MO. • NEwstead 2100

New SINGLE SEATED VALVES



• Unsurpassed refrigeration valves, specifically designed for the control of Freon, Sulphur-dioxide, Methyl-chloride—suction lines or hi-pressure liquid lines. Also air, water, gas, light oil, etc.

• These direct operated, single seated needle valves are held open electrically, thus eliminating unnecessary compressor burdens. Positive shut-off for fractional tonnage installations.

• Features: Die-forged bodies • Hardened steel needles • Corrosion-proof internal parts • Gasketless construction Integral mounting features • Moisture-proof construction • High pressures Single or dual voltage coils.

by

K-15

GENERAL CONTROLS
801 ALLEN AVENUE GLENDALE 1, CALIF.
Manufacturers of Automatic Pressure, Temperature & Flow Controls
FACTORY BRANCHES: PHILADELPHIA • ATLANTA • BOSTON • CHICAGO • DALLAS KANSAS CITY • NEW YORK • DENVER • DETROIT • CLEVELAND • PITTSBURGH HOUSTON • SEATTLE • SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

the eight participating firms ordinarily would have to run has been eliminated.

The purchaser will be the British Ministry of Foods, which contracted with the association to buy up to 9,000 tons at £200 per ton. After receiving payment from the British the packers will turn over the pound sterling exchange to the Chinese government. Their advance payment in Chinese currency was calculated on the basis of £200 at the current Shanghai buying and selling rates per pound sterling.

For a starter, the egg firms (two American, five British and one Chinese) declared 1,000 tons on which they believe they will break even. Continued inflation likely will boost packing costs above CN$9 million per ton. When this happens, the packers will cease declaring tonnages and end operations at the then current production contract.

Even if the full 2,000 tons are exported this year, it will be a far cry from the pre-war business, which normally ran close to 70,000 tons, including about 45,000 tons of whole egg melange, moist and frozen.

Dairy Equipment

AMSTERDAM — The International Bureau for Reparations Payments has decided that the equipment and machinery of the former Zeppelin Airship Factory at Friedrichshafen, Germany, will be turned over, lock, stock, and barrel, to the Netherlands. The Dutch plan to convert the equipment for the manufacture of aluminum parts for dairy factories and breweries.

SCHEDULE OF EVENTS

June

1–30—Dairy Month.
2– 4—Institute of Food Technologists, 7th annual convention, Hotel Statler, Boston.
2– 6—Association of Operative Millers, annual convention, Nicollet Hotel, Minneapolis.
8–10—Bakers Association of the Carolinas, annual convention, Grove Park Inn, Asheville, N. C.
9–10—Grocery Manufacturers of America, mid-year meeting, Skytop, Pa.
9–11—Eastern States Frozen Food Locker Assoc., 1st convention, Hotel New Yorker, New York City.
9–11—American Society of Refrigerating Engineers, 34th spring meeting, Hotel Alexandria, Los Angeles.
15–18—National Candy Wholesalers Assoc., 2nd annual convention, Sherman Hotel, Chicago.
15–19—National Dairy Council, annual summer conference, Edgewater Beach Hotel, Chicago.
16–19—American Society of Mechanical Engineers, semi-annual meeting, Stevens Hotel, Chicago.

July

20–23—Southern Wholesale Confectioners Association, annual convention, Hotel Roanoke, Roanoke, Va.
20–26—Fourth International Congress for Microbiology, Copenhagen, Denmark.

Changes in Food Supplies

(Indicators)

Production

Flour production in mills reporting to the Northwestern Miller reached 18,408,348 sacks in March, an increase of 2,543,864 sacks over February. Assuming that this represents 64 percent of the total March output, the publication estimates a new record production of 28,760,000 sacks.

Ice cream production, in March, was estimated at 45,500,000 gal., 15 percent less than was produced in that month last year. This is the third consecutive month in which production fell below the records established in 1946. The seasonal gain of 20 percent was much less pronounced than the 31 percent February-March increase last year. March production was still 74 percent above the five-year average.

Creamery production in March, estimated at 110,120,000 lb., was an increase of 20 percent over February. The average seasonal gain over the same months last year was 16 percent, the same as the recent five-year average. Production was 43 percent larger than in March, 1946, but 16 percent smaller than the five-year average.

American cheese output came to 78,285,000 lb., in March, the highest production for any month on record. This was 30 percent above February and 33 percent over March, 1946.

Peanuts milled during March reached a total of 202,000,000 lb., the largest output of any March on record. About 160,000,000 lb. were cleaned and shelled and 42,000,000 lb. crushed.

The pumpkin and squash pack for 1946 came to 4,575,000 cases, basis No. 2's, according to the National Canners Association. This compares with the 1945 pack of 1,849,000 cases.

The spinach pack totaled 8,448,000 cases on a 24/2's basis, in the National Canners compilation. This was slightly smaller than the 8,637,000 cases produced the previous year.

Materials

Hatchery production in March dropped 4 percent from the corresponding month in 1946, totaling 255,270,000 chicks compared with 264,737,000 produced in March a year ago. The five-year average for the month is 252,159,000.

Sweet corn production for processing is estimated at 1,212,100 tons for this year, based on the plantings indicated in March. Actual production for canning and freezing in 1946 was estimated at 1,230,900 tons.

Milk production per cow is likely to establish another new record in 1947, according to USDA. In spite of a 2 percent decrease in cow numbers, total milk production for the first quarter exceeded the same period last year by 3 percent. Total production for 1947, however, is not likely to exceed the 119,700,000 lb. produced in 1946, unless pasture conditions are unusually favorable.

The sugar crop in Puerto Rico is forecast at 1,035,000 short tons, which would be an increase of 126,000 tons over last year.

Stocks and Storage

The National Canners Association reports the following stocks on April 1:

	1946-47	1945-46
	1,000 Cases—basis 24/2's	
Corn	3,628	2,834
Peas	6,724	2,422
Green and Wax Beans	2,644	1,607
Canned Tomatoes.	1,535	692
Tomato Juice and Cocktail	7,901	2,290

Frozen fish and shellfish holdings on April 1 were 77,768,722 lb., which compares with 84,265,345 lb. held April 1, 1946.

Freezer storage occupancy declined to 79 percent on April 1, 3 percent below the March 1 standing.

Cooler occupancy saw only a 1 point decline during March, standing at 61 percent filled on April 1.

Index

Business Week's index of business activity stood at 196.6 for the week ending May 10. The preceding week it was 195.9, the month before, 191.0 and a year ago, 166.0.

CONSTRUCTION NEWS

	Pending (thousands)	Total Awarded—May (thousands)	Total Awarded—1947 (thousands)
Bakery	$4,925	$ 55	$ 4,343
Beverages	245	77	2,296
Canning and Preserving	205	...	410
Cold Storage	530	...	1,456
Confectionery	90	...	514
Grain Mill Products	235	484	18,689
Ice, Manufactured.	...	...	55
Meats and Meat Products	124	...	928
Milk Products	395	127	2,424
Miscellaneous	553	...	4,276
	$7,302	$743	$35,391

Basco-TEX

PLASTIC APRONS

Will Not Crack or Peel

POSITIVE PROTECTION against WATER, OIL, ACIDS, ALKALIES

NO LAUNDERING *Just wipe off with a damp cloth. A tremendous cost saver.*

PRICES—COLORS—SIZES

WHITE—
4 Mill Plastic
27 x 36..$ 6.62 per doz.
30 x 36.. 7.53 per doz.
36 x 40.. 7.96 per doz.
36 x 44.. 8.85 per doz.
Full Length Sleeves $6.00 per doz. pair

BLACK or WHITE —8 Mill Plastic
27 x 36..$ 9.00 per doz.
30 x 36... 9.75 per doz.
36 x 40.. 11.15 per doz.
36 x 44.. 13.65 per doz.
Full Length Sleeves $10.65 per doz. pair
Leggins, Hip Length $13.10 per doz. pair

MAROON—Heavy Doubled Coated Neoprene
27 x 36..$12.50 per doz.
30 x 36.. 14.00 per doz.
36 x 40.. 18.35 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per doz. pair
Leggings, Hip Length $23.50 per doz. pair

BLACK—
12 Mill Plastic
27 x 36..$10.25 per doz.
30 x 36.. 11.15 per doz.
36 x 40.. 14.25 per doz.
36 x 44.. 15.80 per doz.

BLACK — Heavy Double Coated Neoprene
27 x 36..$12.90 per doz.
30 x 48.. 14.00 per doz.
36 x 40.. 18.35 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per doz. pair
Leggins, Hip Length $23.50 per doz. pair

BLACK or WHITE —Extra Heavy 20 Mill Plastic
27 x 36..$14.20 per doz.
30 x 36.. 15.80 per doz.
30 x 40.. 20.15 per doz.
36 x 45.. 22.60 per doz.
Full Length Sleeves $14.25 per doz. pair
Leggings, Hip Length $25.75 per doz. pair

ALL PRICES F.O.B. CHICAGO
Minimum order 1 dozen.
ORDER BY MAIL OR PHONE TODAY
Free Sample Swatch on Request

All CLOTH APRONS Now Available
Write for Samples and Prices.

ASSOCIATED BAG & APRON CO.
218 West Ontario St., Chicago 10, Ill.
Phone SUPerior 5809

HERE'S THE
ONE-TWO
PUNCH

for STIMULATING
PACKAGED FOOD SALES

1

GREEN DUCK
The Mark of Quality
MASTERCRAFTERS IN METAL SINCE 1906

METAL LITHOGRAPHED
PREMIUM BUTTONS

Perfect for reaching the juvenile market—and parents thru them. Write for complete details.

2

and its all QUALITY

...for thirst

Mr. Peachy

GREEN DUCK
The Mark of Quality
MASTERCRAFTERS IN METAL SINCE 1906

METAL LITHOGRAPHED
SIGNS

The ideal point-of-sale advertising medium. Colorful, attractive and weatherproof. Effective, yet low in cost. Send for information and prices.

GREEN DUCK
METAL STAMPING COMPANY
1806 W. ROSCOE ST. CHICAGO 13, ILL.

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

BETTER REFRIGERATION—Association of American Railroads is continuing for at least a year more its study of improvements in the construction and operation of refrigerator cars. A very practical trial on the rails is an important part of the program with eight specially built refrigerator cars elaborately fitted with indicating and recording instruments. Food transportation on a better basis at lower cost is, of course, the primary objective. Interested units of industry may keep in touch with the program. Incidentally, many will be happy to know that the modern method of palletized units of freight is being considered in some of the rail tests.

ONE-THIRD GONE — Studies of soil fertility by the Department of Agriculture indicate, according to the Secretary, that one-third of the top soil of the United States has been washed away since Captain John Smith and Captain Miles Standish were leading citizens of Virginia and Massachusetts. The argument is that all interested in crops ought to help valiantly to secure support for soil conservation.

WORLD RECORD—The 1946 corn crop of the world was at an all time peak. This should indicate abundant corn and reasonable prices. But everyone knows that we are also experiencing an all time high record price. Thus, the law of supply and demand is not functioning normally along with many other laws of economics with which man may tamper. Meantime the food industries pay exceedingly high bills for agricultural raw materials.

CITRUS BURDENS — Production of citrus fruit will increase by at least 25 percent between now and 1952, according to official estimates. This means that some important development of new markets must be accomplished, or a price collapse and serious industrial reaction can be expected. The Department of Agriculture is putting this problem very high on its list for investigation under the Research and Marketing Act of 1946. The citrus advisory committee, at its April session, made a number of suggestions as to specific studies. No one, however, believes that all of them combined, as now anticipated, will absorb the total of 50,000,000 boxes per year, the five-year crop increase expected. Non-food products from citrus fruit are, therefore, to be sought diligently.

ACCURATE RULES NEEDED — Very clear rules regarding working requirements are needed in every future labor contract. This will be true regardless of the form in which Congress finally enacts its revision of the labor laws. Washington is convinced that much of the recent difficulty in calculating overtime and settling wage questions has been caused by ambiguity in union contracts or working agreements. Apparently this situation places squarely on the table of food plant management a new responsibility for accurate phrasing of that part of the labor rules for which it is responsible.

"COME TO REST"—When foods, which have moved in interstate commerce, have come to rest at some warehouse or customer destination, they have passed out of the control of Food and Drug Administration, under recent court rulings. This situation developed under a ruling of the Ninth Circuit Court of Appeals, which the Supreme Court refused to review. Now comes Food and Drug Administration with a proposed amendment of the law. They are seeking to add, and are likely to have Congressional approval for, an insert after the words, "when introduced into or while in interstate commerce," the following: "or while held for sale after shipment in interstate commerce."

"CERTIFIED" FOODS—In order to permit continued allocation of most goods, it is necessary under the pres-

CHANGE OF ADDRESS

DIRECTOR OF CIRCULATION, FOOD INDUSTRIES
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Please change the address of my Food Industries subscription.

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

ent law that both Secretary of State and Secretary of Commerce certify that these goods are necessary to meet international commitments of the United States. Most of the commodities that have been so certified are foods, showing the continuing importance of Uncle Sam as a world feeding agency. The original group of items certified as in short supply included: fats and oils, oil bearing seeds, beans and nuts, meat and meat products, butter, grain and grain products, rice and rice products, and dried beans and peas.

MORE FOOD IMPORTS—Washington is expressing surprise over unexpectedly large copra imports from the Philippines. Even more enthusiastic satisfaction has been expressed over constantly increasing sugar supplies from the Caribbean. But the markets of America for domestic use and for export in manufactured foods seem insatiable. As one critic puts it, only a major depression will stretch present food supplies, because everybody has plenty of spending money even under high prices. The cure may be worse than the disease.

TRADE MARKS—New opportunities to get better trade mark protection are provided by the law, which takes effect shortly. But the law also imposes certain obligations on owners and users of trade marks. Most of these are not a responsibility of the technologists. But in view of the importance of the subject to his company, each food technologist will probably want to be sure that someone is taking care of these questions in their new form before it is too late. Especially we should revalue old trade marks to be certain that present practice in the factory and present standards for the goods sold are adequately presented when reregistration is called for.

PROMPT APPLICATION—Federal courts are more and more insisting that patents must be applied for promptly. In the past many companies have undertaken to protect the exclusive use of their inventions by secrecy. Later on, when secrecy seemed to be breaking down, these companies have sought patent protection for the exclusive features of their business. Recent court decisions again emphasize that Federal courts are not going to grant that privilege any longer.

Application for a patent must be made within 12 months of the first commercial application of the invention. It is not feasible to use secrecy for awhile, and later resort to patents. When the initial decision is made as to which protection will be used, the decision can no longer be changed, as seemed permissible under earlier court ruling. This means that research results of a patentable sort must be once and for all handled on one basis or the other. No second guess is going to be allowed us.

Manufacturers and processors of food products find in Monsanto mineral supplements a high purity and uniform quality that adds both nutritive and sales values to their products.

Monsanto is the world's largest commercial producer of elemental phosphorus, refined in huge electric furnaces to better than 99.9% purity. Many of its derivatives are widely used, not only in food products but also in many soft drinks.

Ask for new booklet "Phosphorus . . . the Light Bearer." Contact the nearest Monsanto office or write: MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Chicago, Boston, Detroit, Cleveland, Charlotte, Birmingham, Cincinnati, Los Angeles, San Francisco, Seattle.

In Canada:
Monsanto (Canada) Ltd., Montreal.

MONSANTO CHEMICALS

Serving Industry...Which Serves Mankind

FOR THE PREVENTION OF BROWNING OF FROZEN FRUITS

ASCORBIC ACID-CITRIC ACID MIXTURE

As soon as a fruit is peeled or sliced, it is exposed to the action of atmospheric oxygen. The first result of this exposure is the oxidation of the ascorbic acid (Vitamin C) naturally present, and as soon as this has occurred certain substances also present are next attacked causing the development of a brown color. The rates at which these oxidations take place are also greatly increased by certain enzymes present in the fruit.

Since the ascorbic acid must first be oxidized before "browning" occurs, this latter can be postponed by adding additional quantities of the ascorbic acid and naturally the more that is added the longer "browning" is delayed, although with the enzymes present, to speed up the oxidation, it will eventually occur.

Experimental work carried out in the laboratories of Chas. Pfizer & Co., Inc., has demonstrated that by adding a small amount of citric acid to the fruit the enzymes, which cause rapid oxidation, are inactivated and only a relatively small amount of ascorbic acid need be added to protect cut or frozen fruits against "browning".

Chas. Pfizer & Co., Inc., now has available an ascorbic-citric acid mixture (4% ascorbic acid U.S.P., 96% citric acid anhydrous) which combines the enzyme-inactivating effect of the citric acid with the anti-oxidant effect of ascorbic acid to give better protection against the "browning" of frozen fruits *and at a lower cost.* For further information please inquire of Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 W. Grand Avenue, Chicago 10, Illinois; 605 Third Street, San Francisco 7, Calif.

PFIZER QUALITY

PFIZER

Manufacturing Chemists Since 1849

MEN • JOBS • COMPANIES

INDUSTRY

The Borden Co., New York, recently elected C. A. Eckburg and Charles F. Kieser to the company's board of directors. Both men have been vice-presidents since 1941.

Curtice Brothers Co., Rochester, N. Y., plans to begin operations at its new $500,000 canning plant there in late August.

General Mills, Inc., Sperry Div., Los Angeles, has begun construction of its new $2,000,000 flour mill and grain elevator. The seven-story concrete mill will provide about 80,000 sq. ft. of floor space. The elevator will be of welded steel construction and the 66 grain storage bins will have a total capacity of 600,000 bu., to be increased later to 1,050,000 bu.

Francony Laboratories Inc., Jamaica, N. Y., has been formed to manufacture and distribute a vegetable albumin to be known as Albuveg, developed for the confectionery industry. Paul W. Frangos is head of the firm.

H. J. Heinz Co. plans a $340,000 expansion program at its Fremont, Ohio, plant. Equipment will be installed for the manufacture of meat stock soups, a new operation for Fremont.

The J. E. Hutchman Co., Lakeland, Fla., has begun commercial operations to dry citrus seeds for conversion into oil. The company expects to use about 50 tons of seeds a week. The dried seeds will be shipped to Gainesville, Ga., where a subsidiary processing plant will convert them into an oil to be utilized by the plastics, soap, cooking oil and mayonnaise industries. Ultimate plans call for moving the Gainesville plant to Lakeland to become part of a proposed $500,000 operation handling 250 tons of seeds a day and turning out five different products.

Kitchen Ease Food Products Co., Lansing, Ill., is processing Spanish olives and olive oil, biscuit mix, gingerbread mix, maraschino cherries and pie crust mix under the brand name of Pantry Queen. Roland D. Ross, formerly with Swift & Co., Chicago is co-owner, president and general manager.

Libby, McNeill & Libby, Chicago, is expanding and making changes in its production facilities at the Hartford, Wis., canning plant. Completion is scheduled for some time this fall.

National Biscuit Co. soon will begin work on a $4,600,000 project for the expansion and modernization of the Niagara Falls plant. When completed, the unit is expected to more than double the present plant's capacity.

CHARLES T. BERINGER

The new president of the Wine Institute, San Francisco, is Charles T. Beringer, a Napa County wine grower. He was elevated from a directorship to the presidency at the thirteenth annual membership meeting at the Palace Hotel, San Francisco.

CHARLES D. CUFFE

Having been with the company for 35 years, Charles D. Cuffe recently was named vice-president of Worcester Salt Co., Silver Springs, N. Y. He succeeds E. H. Pendleton, who retired after 49 years of service.

Owens' Country Sausage Co. has opened its new plant near Dallas, Tex. The company is processing sausage and other fancy pork and beef products, as well as frozen fruits and vegetables and ice cream. Sam J. Edwards is production manager for the firm.

Realfoods, Inc. is building a plant for canning and freezing vegetables and fruits at Tiptonville, Tenn. Expected to employ 300 persons, the operation is headed by R. G. Craddock of Ridgely, Tenn.

Sperti Citrus, Inc., Orlando, Fla., has converted its pilot concentrate plant into an active processing plant making frozen concentrate by the centrifuge method. Present capacity is 700 gal. of concentrate a day.

Sprague-Warner Div. of Consolidated Grocers Corp., Chicago, is constructing a 334,000 sq. ft. building on Goose Island for warehousing and shipping operations.

Stadler Brothers, Columbus, Indiana, meat packer, has announced plans for doubling its plant facilities during the next five years. When the new addition currently under construction is completed, much of the old plant space will be converted to warehouse facilities.

Standard Packing Co. has completed a merger with B. Schwartz & Co., Chicago, making the latter company one of the largest independent meat packers specializing in service to hotels, restaurants and institutions. George Zaslaw, formerly president of Standard Packing, has been made plant superintendent.

Zero Food Storage Corp., Chicago, has purchased a cold storage warehouse in the Stock Yards district formerly owned by Swift & Co. The warehouse has a freezer storage capacity of 12,000,000 lb. and a cooler capacity of 4,000,000 lb.

T. P. McCONVILLE

Having worked in food technology and research for Deerfield Packing Co., Bridgeton, N. J., T. P. McConville has been made director of food research and quality control for the marketing division of Cooperative G. L. F. Farm Products, Inc., Ithaca, N. Y.

RAPID-WHEEL CONVEYORS
cut manpower 50% at bottling plant

Installation of a RAPID-WHEEL Conveyor system at the DEL RIO WINERY of Woodbridge, California, has made it possible for a whole freight car (1500 cases of wine) to be loaded in two-and-one-half hours, using only three men. *This represents a 50% saving in manpower,* to say nothing of the savings in breakage and time, over previous inefficient hand truck, floor truck and strong back methods.

Movement of cartons of bottled wine from filling rack to labeling table, to carton sealing and stenciling and finally to freight cars was a long and arduous task. The *Rapids-Standard system made it easy.* First they used gravity conveyor alone, then added a portable power belt conveyor (Stevedore, Jr.) at the point where the labels are pasted on. A highly satisfactory arrangement!

Records show "no cases lost" over a period of three months!

It's wise to Conveyorize! Complete information about the construction features and uses of RAPID-WHEEL GRAVITY CONVEYORS, and standard accessories, will be sent to you free of charge.

OFFICES IN PRINCIPAL CITIES

Manufacturers of
STEEL FORGED, CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

The Rapids-Standard Co., Inc.

Sales Division—361 Peoples National Bank Bldg., Grand Rapids 2, Mich.

PERSONNEL

C. Harry Bleich has been appointed assistant sales manager, Western Div., California & Hawaiian Sugar Refining Corp., Ltd., San Francisco.

L. Leroy Farmer, formerly owner of Farmer Canning Co., Cedar Rapids, Iowa, and president of Corn Canners Service Bureau, Chicago, has resigned his position with the bureau. T. Stran Summers, of Charles G. Summers Co., Inc., New Freedom, Pa., was elected to fill the vacancy.

James J. Foy has been elected president of Martin Food Products Co., Inc., Chicago, processor of Lady Corinne jams, jellies and preserves as well as Pal peanut butter.

Hugh A. Hamilton, former supervisor of the process engineering department of the Lake Charles, La., plant of Cities Service Co., is now technical superintendent of the General Mills, Inc., fatty acid and acid derivatives plant under construction at Kankakee, Ill.

William F. Henry, formerly director of research, Illinois Cereal Mills, Paris, Ill., is director of research, Lauhoff Grain Co., Danville, Ill.

Vernon C. Hoeger, formerly in the quality control laboratory of Beatrice Foods Co., Chicago, is now supervisor of quality control for the Chicago area of Kraft Foods Co.

Charles Kirckhoff, formerly plant superintendent, International Dairy, Chicago, has become part owner and manager of Learn Dairy at Rochelle, Ill.

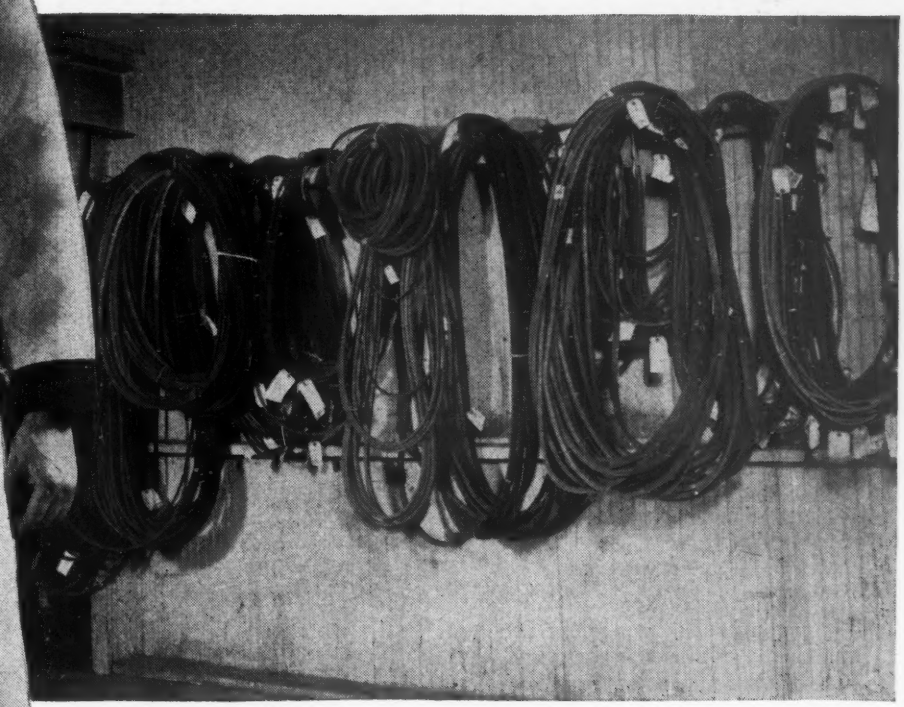
Louise W. McDevitt has resigned as secretary of P. J. Ritter Co., Bridgeton, N. J. She had been with the company 54 years, and is succeeded by Isabel Hermon, formerly assistant secretary.

Jack H. Mitchell, Jr., formerly connected with the Chemical Warfare Service Technical Command, is in charge of the food section, biochemistry division of Southern Research Institute, Birmingham, Ala.

M. D. Mize, director of the Chicago laboratories of Wallace & Tiernan Co., Inc., has retired. Mr. Mize had been with the organization 11 years and in 1945 was transferred to the Chicago office to design the flour service laboratories.

Alvin I. Nelson, formerly food technologist for New York Frozen Foods Corp., Brockport, N. Y., is now technical supervisor, frozen fruit and vegetable department, Loudon Manufacturing Div. of Standard Brands, Inc., Terre Haute, Ind.

How Many Spare V-Belts Do You Really Need?



With only four reels of Veelos, he has a choice of 316 standard sizes.

WHEN Veelos on reels goes into a stockroom, a costly mass of many-size endless V-belts is eliminated. Four reels of Veelos, the link V-belt, provide replacements for as many as 316 sizes.

Do you require less? From a single 100-foot reel of Veelos any length V-belt can be quickly uncoupled, made endless and installed. You need *not stock even one* spare endless V-belt. There is none to age and deteriorate. With Veelos on reels, desired belt lengths are always available, easy to locate. Stock records are simplified... storage space saved.

Veelos is available in all standard sizes, fits all standard grooves, is packaged on standard 100-foot reels. Ask about the many, exclusive advantages of Veelos on reels.

Over 300 Veelos distributors and sales engineers located in principal cities to serve you.

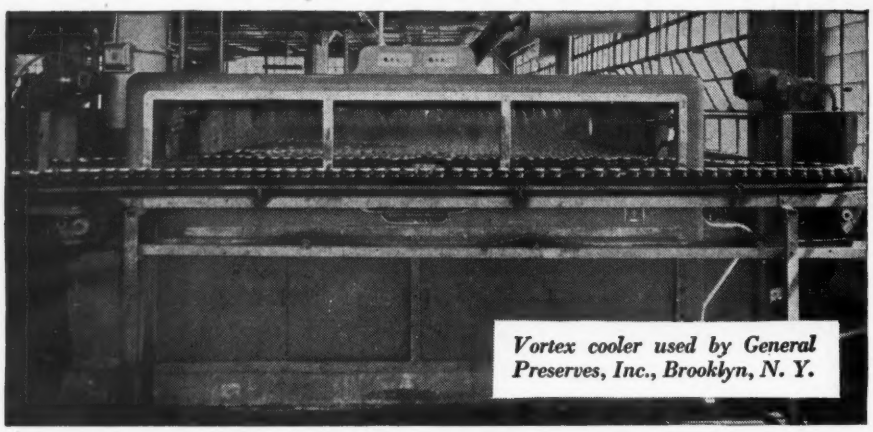
MANHEIM MANUFACTURING & BELTING CO.
MANHEIM, PENNSYLVANIA

VEELOS
THE LINK
V-BELT

Adjustable to any Length
Adaptable to any Drive

Tested, Proved and Adopted by American Industry

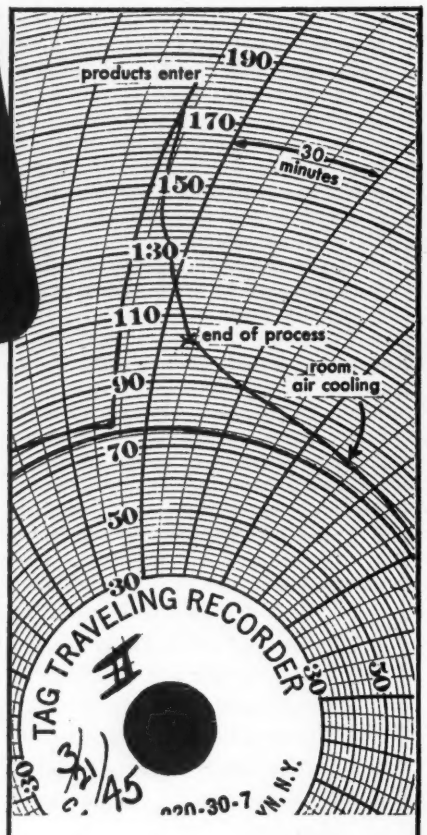
Known as VEELINK outside the United States



Vortex cooler used by General Preserves, Inc., Brooklyn, N. Y.

Your Hot Packaged Foods Deserve

VORTEX Automatic Cooling



The process recorded above is cooling 1 lb. hot marmalade jars 80° F. within 20 minutes to packing temperature.

Automatic cooling of your products deserves scientific treatment to preserve the original flavors and clarity by *positive* control of time and temperature.

The Vortex system is entirely automatic in operation and can be run continuously without operators, requiring only routine maintenance. The heat exchange medium is atomized water, distributed over the containers in such a manner that maximum cooling is achieved with a minimum quantity of water.

Vortex coolers are widely adaptable to individual requirements and have an almost limitless capacity range for all sizes of jars, bottles or cans. The use of these machines greatly conserves floor space and allows for immediate labeling and packing. A rapid drying system can be supplied with the discharge conveyors, if desired.

Whatever your problem of cooling—or heating—your products, it will pay you to learn the Vortex method of achieving uniform results economically. Send us your process requirements and write for bulletin No. 87 today.

BARRY-WEHMILLER MACHINERY CO.

1946.... Our 61st Anniversary St. Louis, Mo., U.S.A.

William Perlman, former production manager of American Home Foods, Inc., with headquarters at Processes, Inc., Milwaukee, is now with Dennison Foods, Inc., Oakland, Calif.

A. B. Sparboe, who has been president of the overseas division of Pillsbury Mills, Inc., Minneapolis, is president of the newly created flour milling division of Pillsbury Mills. Paul S. Gerot, vice-president of sales and advertising of the flour and cereal div., has become president of the new grocery products division. The two new divisions are an outgrowth of the flour and cereal division.

Wayne I. Tretsven, formerly with research department of Beatrice Foods Co., Chicago, is now a consultant to the dairy industry, specializing in cottage cheese and cheese fermentation technology. His headquarters are in Chicago.

G. H. Welts, formerly a sanitarian with the Evaporated Milk Association, now is in charge of quality milk production and field work with the Cloverleaf Dairy, Gary, Ind.

Arthur L. Wiley has succeeded J. Walter Cooper as manager of the Swift & Co. plant food division at Atlanta, Ga. He has been with Swift for 41 years, having served the last 15 years as manager of the Norfolk, Va., div.

DEATHS

Conrad Buehl, 69, master brewer, Ambrosia Brewing Co., Chicago, March 17.

William H. Firmage, 32, director and vice-president of Nehi Beverage Co. of Utah, Salt Lake City, March 25.

William F. Heide, 70, president of Henry Heide, Inc., New York, April 27, at Glen Cove, N. Y.

William F. Jacobs, 78, former president of Jacobs Packing Co., Nashville, Tenn., April 2.

Louis Kimpel, 82, former superintendent of the Boston factory of Huyler's, April 3, at Dorchester, Mass.

Edward F. Parrot, 59, general manager of the Parrot Packing Co., Fort Wayne, Ind., March 20.

William F. Saul, 82, president of Purity Ice Cream Co., Seattle, Wash., March 25.

Adolph Schmidt, 60, vice-president and director of sales for Olympia Brewing Co., Olympia, Wash., April 11.

If you're see-sawing at your packaging conference

Sparkling transparency for maximum sales appeal . . . chemically tailored moistureproof protection for the preservation of product quality . . . at low cost. When you consider that Du Pont Cellophane gives you all these advantages, you can see that it offers the right balance for a package.

There are over fifty different varieties of Du Pont transparent films (Cellophane and cellulose acetate films) produced to meet the requirements of a wide variety of products.

Today the supply of Cellophane is limited, but we hope the day will soon come when converters and ourselves can meet all demands. Meanwhile, we will be glad to discuss your packaging problems. E. I. du Pont de Nemours & Co. (Inc.), Cellophane Division, Wilmington 98, Delaware.

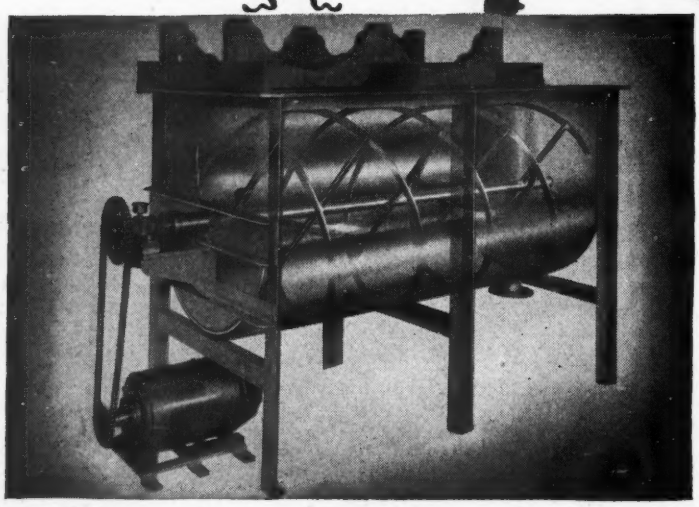
DU PONT
REG. U. S. PAT. OFF.

YOU STRIKE THE RIGHT BALANCE WITH

Du Pont Cellophane

Shows what it Protects—at Low Cost

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY



Planning new corrosion resistant processing equipment? Keep in mind that between blue print and finished vessel the experience, skill and plant of your fabricator may determine how much return you get from your investment—how long and how well it will serve in your plant for your special applications.

We are specialists in stainless steel and alloy fabrication – work exclusively with these metals. Our experienced staff of engineers and mechanics – the special tools, dies and machinery we use – give you increased returns from your expenditures for stainless steel equipment. Consult with us.

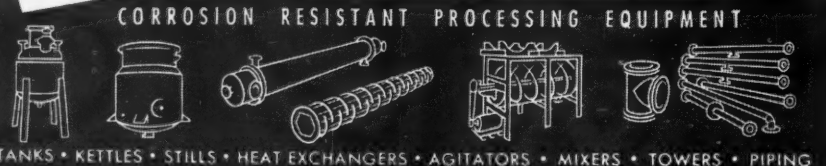
S. BLICKMAN, INC. 4106 GREGORY AVENUE • WEEHAWKEN, N. J.

S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK

A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT



TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

Frank M. Warren, 71, president of Warren Packing Co., Portland, Ore., April 12.

W. R. H. Weldon, 83, former Safeway Stores president, Pasadena, Calif., April 15.

Alfred Wolfheim, 57, president of Pacific Coast Products Co., Seattle, Wash., March 5.

Louis Zwissig, Zwissig Bros. Dairy, San Francisco, March 7.

ASSOCIATED INDUSTRIES

Camp-Betner Corp. has been formed by the Benj. C. Betner Co. of Devon, Pa., and the Camp Manufacturing Co. of Franklin, Va. Arthur B. Collins is president and manager of the new corporation.

Eastern Industries, Inc., New Haven, Conn., has purchased the buildings, machinery and product production rights of the McIntyre Co., Newton, Mass., manufacturer of precision pumps and fluid motors.

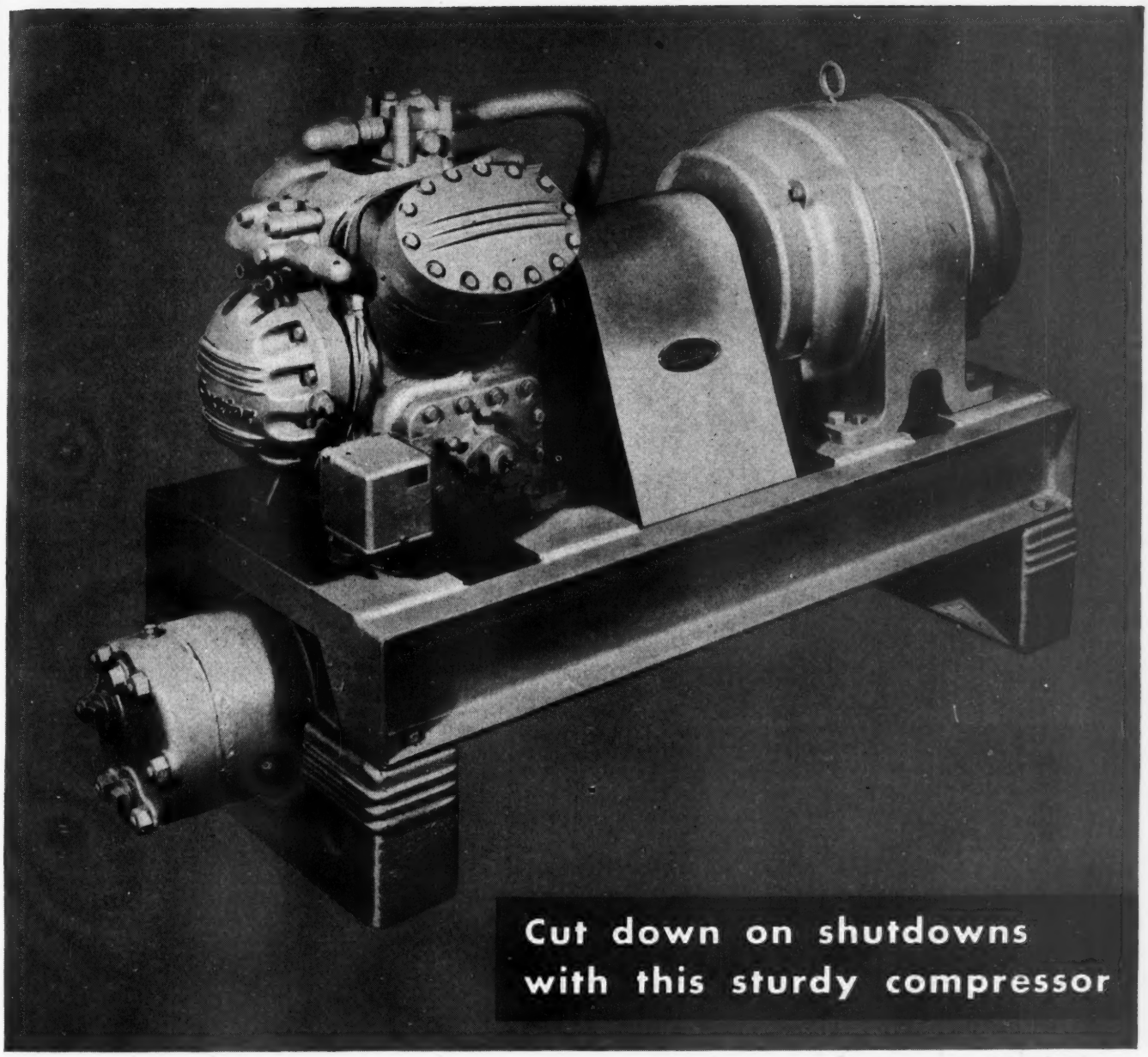
Monsanto Chemical Co., St. Louis, has appropriated $500,000 for relief among its employe victims of the Texas City disaster. Benefits to be paid from this sum are over and above all the company's legal liabilities, which are covered by insurance.

Owens-Illinois Glass Co. is sponsoring a national bottle recovery campaign, in an effort to get back into circulation some of the deposit bottles now being held by customers. Cooperating in the drive are milk producers, beverage bottlers and brewers. The milk people estimate that 25 million empty milk bottles have accumulated in American homes.

The Standard Stoker Co., Inc., has announced the resignation of James T. Duffy, Jr., as vice-president of the company and as general manager of the Read Machinery Div., at York, Pa. Theodore F. Freed has been appointed as general manager to succeed Mr. Duffy.

Shellmar Products Corp. has announced the resignation of C. A. Southwick, Jr., as director of research and development. He will set up an independent consultation service on packaging and plastics.

Wheelco Instruments Co., Chicago, manufacturer of industrial measurement and control instruments, has announced the election of Elmer Schneider to a newly created position of vice-president and director of engineering.



FREE COMPRESSOR BOOK. The timely new book, "Carrier Refrigeration Compressors and Condensing Units," is now ready. It contains a wealth of application hints and data on Carrier refrigeration units. You'll want to keep it handy for reference. Write for your copy today. It's free.

CARRIER'S new 5F40 compressor is engineered especially to stand up under hard, continuous service. Its rugged construction makes it the economical unit for food freezing, chilling and storage plants . . . any application where frequent shutdowns would threaten profit.

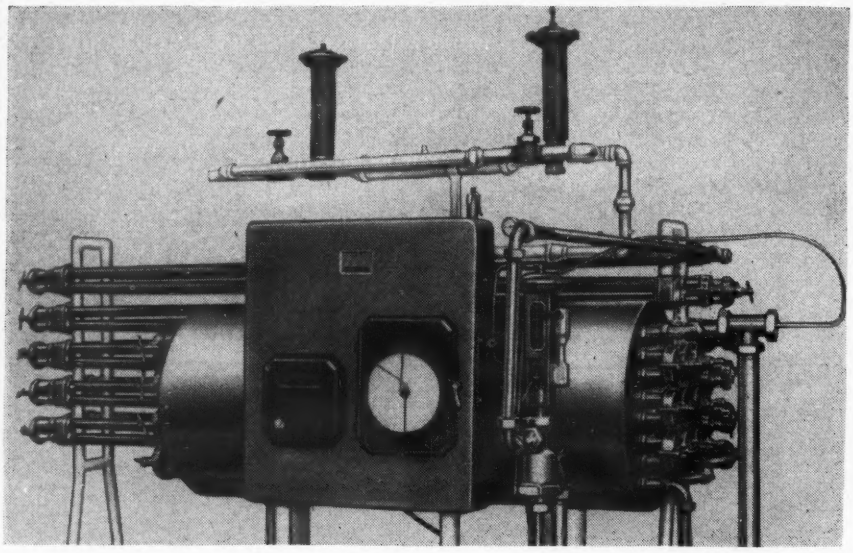
Every part of the 5F40 is carefully designed to deliver maximum refrigeration day in and day out. The crankcase and cylinder block are nickel-alloy iron. Cylinder sleeves are precision honed. Both main and crankshaft bearings are precision type. The four-ring pistons are treated to prevent break-in wear. Stationary metallic bellows-type seal is continuously immersed in oil. Ring-type suction and discharge valves are vapor-cushioned, non-flexing. The 5F40 has *built-in* capacity control. Unloaded starting permits use of normal torque motors. Available in 10-hp. capacity.

There are Carrier compressors for every type of refrigeration job. They offer all the advantages of Carrier's experience and leadership in refrigeration design. That's your assurance of long, economical service. Carrier Corporation, Syracuse, New York.

Carrier

AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING

FOOD EQUIPMENT NEWS



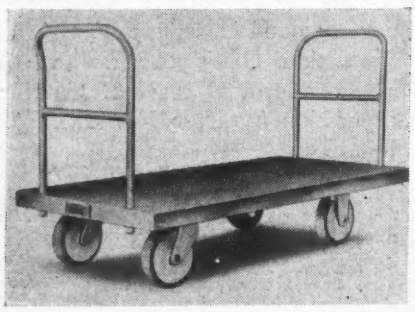
Ste-Vac high temperature pasteurizer for cheese plant.

Pasteurizer 1

A UNIT that provides the means of pasteurizing cheese milk at temperatures up to 190 deg. without the problem of "burn-on" is produced by the Chester Dairy Supply Co., Dept. I, Chester, Pa. It is sufficiently flexible to allow pasteurization at any temperature between 160 and 190 deg. Heart of the unit is the Ste-Vac heater, specifically designed to heat milk and milk products without formation of milk stone or "burn-on" on heating surfaces. In this unit all milk contact surfaces are highly polished stainless steel, return cups are interchangeable and simple one-time use paper gaskets are employed. By using this and other Chester equipment, milk for cheese can be pasteurized and immediately cooled to the desired setting temperature continuously.

All-Aluminum Trailer 2

A NEW all-aluminum trailer or hand truck, with a normal capacity rating of 2,000 lb. and weighing but 175 lb. is announced by Mercury Mfg. Co., Dept. I, 4030 S. Halsted St., Chicago 9, Ill. It is standardly manufactured with a load platform 3 ft. x 6 ft. x 14½ in. high. Frame construction is aluminum alloy, while the deck is non-skid aluminum plate 3/16 in. thickness. Deck and frame are of welded assembly. Other features include cured-on, solid rubber, tire type wheels, Timken-bearing mounted.



All-aluminum trailer or hand truck.

Tubular Table 3

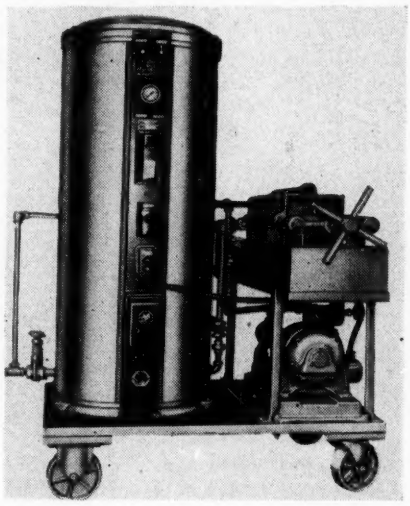
SANITARY tables for inspection, trimming, peeling, picking and packaging foods, as well as conveyors and elevators, constructed of all-welded steel tubing have been developed by the Boutell Mfg. Co., Dept. I, 558 Lyell Ave., Rochester 6, N. Y. All recesses in which food particles collect and in which mold forms, have been eliminated, assuring complete sanitation and a better, cleaner product.

Bobtail Soda Fountain 4

A NEW type of bobtail soda fountain, embodying mechanical freezing principles heretofore not used in such products has been developed and is in volume production at Maxwell-Taylor Industries, Inc., Dept. I, Detroit 2, Mich. The new fountain has no visible coils. Refrigerant passes through the walls surrounding the storage compartments, resulting in fastest possible removal of heat and maintenance of desired temperature level with low electrical current consumption. Up to 30 gal. of water per hr. is cooled to 40 deg., and 12 cu. ft. of bottle and other storage space is provided in an overall length of 7 ft. 1 in.

Fat Purifier 5

A NEW unit, suitable for either batch or continuous fryers, that combines filtration and purification to maintain cooking oils and fats in a clean, sweet condition is announced by Honan-Crane Corp., Dept. I, 706 Wabash Ave., Lebanon, Ind. Intermittent circulation through an absorbent medium removes the products of oxidation before they can build up to an objectionable concentration. Suspended, over-cooked particles can be continuously removed by circulating the oil through the filter press which is an integral part of the unit. Fabricated from non-catalytic metal, the unit operates for long periods without attention. Sizes available to purify 3½ to 20 gal. of oil per min.



Unit prolongs useful life of cooking oils.

WRITE FOR MORE INFORMATION

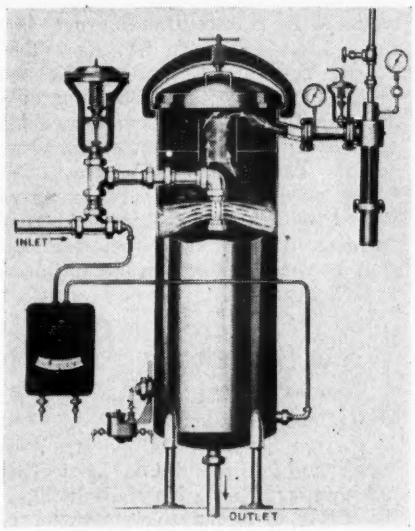
Food Industries Reader Service now makes it easy for you to follow up the news on new equipment and new materials. Tear-out coupon cards are supplied for your convenience on the special colored page which follows the equipment news section in this month's issue. Enter your requests, fill out and mail cards, and let Reader Service do the rest.

Air Eliminator Valve 6

DEVELOPMENT of an industrial-use air eliminator valve, for special application in steam-processing operations involving pressures up to 125 lb., or where steam heating is done at pressures above 15 lb., is announced by The Lodge & Shipley Co.'s Risselt Div., Dept. I, Cincinnati, Ohio. The valve is made of heavy brass bar stock. Its functioning mechanism is a 12 convolution 1½-in. monel metal bellows. An interchangeable valve seat, which is threaded into the bellows, permits easy replacement.

Deaerator 7

CHAIN BELT Co., Dept. I, Milwaukee, Wis., announces production of the REX Micro-Film Deaerator, a unit

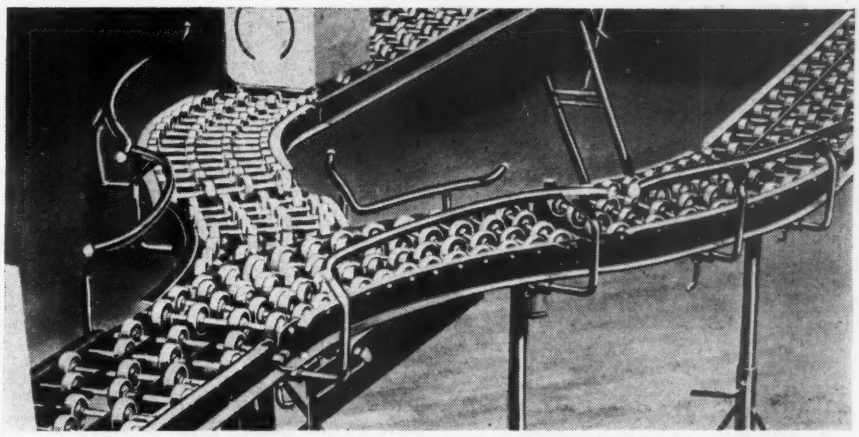


Unit removes air from catsup and juices.

which provides instantaneous removal of both dissolved and occluded air from liquid and semi-liquid foods, such as catsup, vegetable and citrus juices. It consists of four basic elements: a vacuum chamber, product flow system, vacuum system, and control system. The product to be deaerated is introduced into the vacuum chamber in extremely thin streams. Impingement upon the interior surface causes a portion of it to flash or boil into vapor. This provides instantaneous removal of both dissolved and occluded air. Operating results show consistent air removal of 98 to 99 percent on both cold and hot juices. The deaerator has no moving parts or shafts that require the use of seals. Access for inspection and cleaning is by the removal of light-weight aluminum cover clamp.

Applesauce Cooker 8

A CONTINUOUS applesauce cooker, with a 6,000 lb. hourly production capacity is made by Allen Iron & Welding Works, Dept. I, Rochester 6, N. Y. The basic operating unit is the long cooking chamber that houses the specially designed paddle mechanism which agitates the mixture as it is cooked. Two feed bins are set directly above the cooking chamber. Sugar from the upper bin is carried by a worm to the lower bin, where it is mixed with chopped apples. The mixture is then conveyed to the end of the cooking chamber where it contacts the cooking steam. Operating speeds of the worm feeds are synchronized by a variable speed transmission, and paddle shaft speed in cooker is likewise controlled. All parts that contact products, including steam inlet fittings, are 18-8 stainless steel. Taylor Fulscope controller, air operated valves, and Taylor Thermoguide permit close check on cooking temperature to insure applesauce at the correct thermal point for sealing.



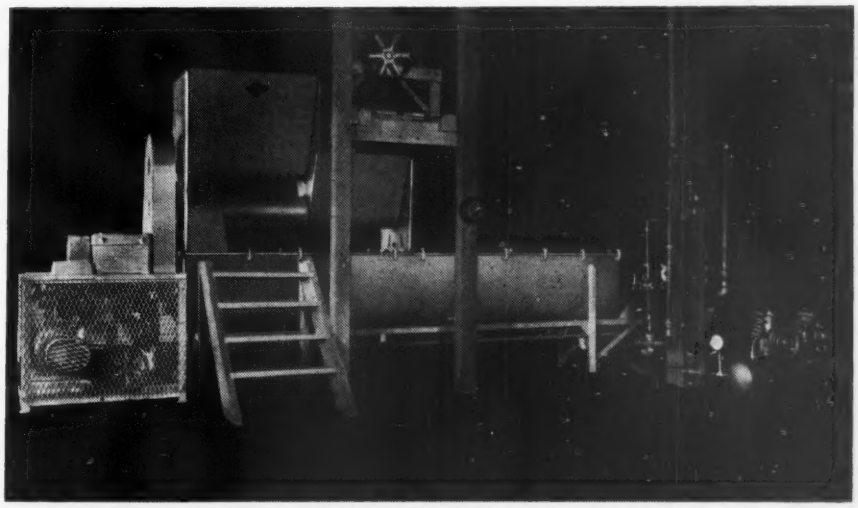
Two parallel lines of gravity conveyor converge by means of Y-switch.

Y-Switch Curve 9

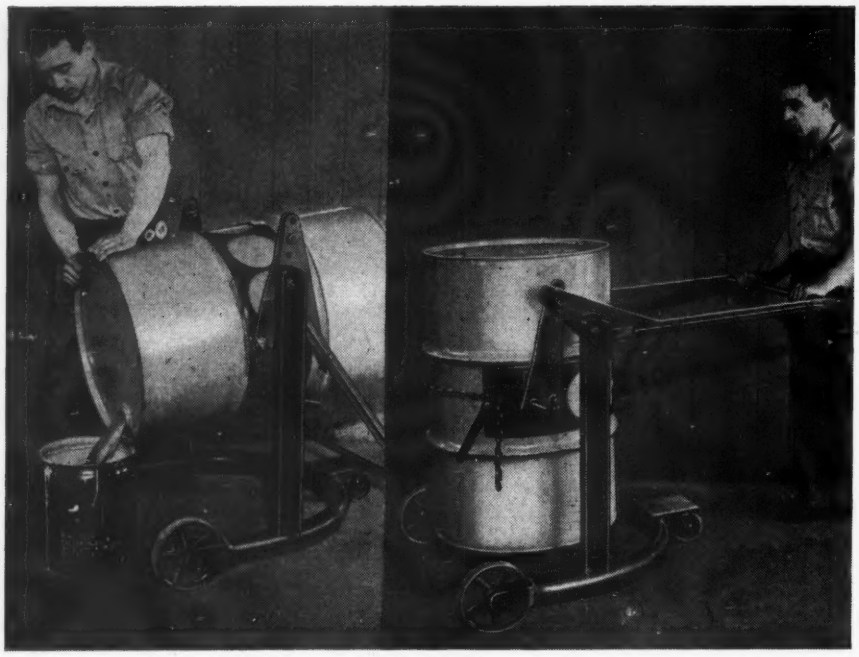
A NEW Y-switch curve for use with Rapid-wheel gravity conveyor installations has been introduced by the Rapids-Standard Co., Inc., Dept. I, Grand Rapids, Mich. Its use allows packages to be sorted and routed separately to designated areas for either storage or shipment. Curve sections may be added to make possible the erection of two lines diverging 90 deg. from the main line, or two lines parallel to the main line. It may also be utilized in reverse to converge two parallel lines to a main line. Finally, two lines may be made to lead in directions 90 deg. opposite to each other. Control is effected by a manually operated lever that actuates a lever-and-cam mechanism to raise a steel switch plate on which is positioned a set of independently mounted conveyor wheels. The switch curve is manufactured in 12- and 18-in. widths. It may be supported on adjustable spans similar to those used on straight sections. Each terminal is equipped with universal connections to permit coupling with either end of a straight section. Adjustable guard rails are furnished as standard equipment.

Pallet Truck 10

A HYDRAULIC pallet truck equipped with plastic wheels is announced by the Lewis-Shepard Products, Inc., Dept. I, 328 Walnut St., Watertown 72, Mass. This truck is also equipped with spring-lift booster rollers mounted in back of the rear wheels. These rollers will eliminate bumps caused by the ordinary series of small fixed rollers. Also, the chamfering of boards is no longer necessary. The truck is built in capacities ranging from 1,000 to 6,000 lb., and is adaptable to either single or double-pallets.



Stainless steel continuous applesauce cooker has capacity of 6,000 lb. per hr.



Loaded drums are easily raised, rotated or tilted for pouring by improved barrel lift.

Improved Barrel Lift 11

A BARREL lift that raises loaded drums off the floor with ease, transports them and is arranged for tilting to dispense the contents is announced by the Falstrom Co., Dept. I, Passaic, N. J. Drums are maintained in a nearly balanced position and little effort is required for rotating them when thorough mixing prior to pouring is desired. Pick-up is simple with a safety locked chain arrangement encircling the drum. The mechanical linkage is adjustable to give several degrees of leverage permitting the handling of drums up to 750 lb. Saddle tilt locks hold open head drums in vertical position during transport. Drums may also be locked in tilted position. Weight 113 lb.

Clamp Kit 12

A NEW Clamp-Master Kit that is ideal for hose clamping, maintenance of a general nature and repairs such as splits or breaks in pipes, posts, ladder rails, shovel handles or other similar items has been developed by the Punch-Lok Co., Dept. I, Chicago 7, Ill. It contains a Clamp-Master tool for tensioning and locking all clamps, 31 flat strip steel clamps of assorted sizes, 14 open end clamps for use where the ends of the object to be clamped are obstructed.

Aluminum Caster 13

A NEW caster with wheels of aluminum alloy is announced by The Market Forge Co., Dept. I, Everett 49, Mass. Due to the inherent greasiness of aluminum, the wheels do not wear floors as rapidly as other metallic wheels. This also prevents rapid wear of the wheel itself. The face of the wheel is machined concentric with the axle and runs on roller bearings equipped with hardened inner races and furnished with Zerk fittings. Available in both swivel and rigid types, equipped with 4 in. x 2, 6 in. x 2 and 8 in. x 2 aluminum alloy wheels.

Diaphragm Valve 14

A NEW design in diaphragm motor valve construction has been announced by the Fischer & Porter Co., Dept. I, Hatboro, Pa. These valves, known as "Valvrator," are an outgrowth of the recording-controlling Flowrator instrument. Among new design features is the dished-bonnet construction with flush-seated bodies and through-bolts. No bonnet flanges are included in the body construction; the design results in a compact unit with the lowest possible weight and greatly simplified cleanout characteristics. Body materials such as iron, bronze, stainless steel, carbon steel, hard lead, haveg, hard rubber, monel, nickel, hastelloy and even porcelain are regularly available. The valve is made only in 150 lb. construction in sizes from ¼ to 1 inch screwed, and from 1 to 3 inches flanged.

Dry Filling Machine 15

A NEW semi-automatic, inexpensive accurate net weight filling machine designed to handle a wide range of dry products such as nuts, small vegetables, candies, coffee and powders, has been introduced by Glengarry Machine Works, Inc., Dept. I, Philadelphia 10, Pa. Designed for extreme accuracy, Thrifty Weight, as it is called, is clean to operate and easy to clean. It has few parts and little motion, weighs quantities up to 2½ lb., handles containers ranging from 1 to 10 in. high, and will not empty its batch until container is in place.

Inter-Communication 16

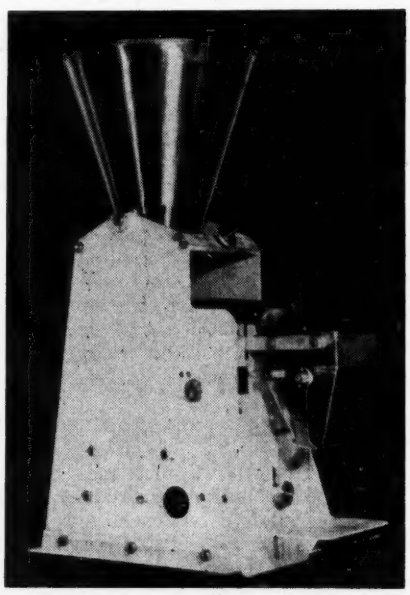
A LOW-PRICE electronic inter-communication system consisting of one master station working with a maximum of 10-sub-stations has been developed by Talk-A-Phone Co., Dept. I, 1512 So. Pulaski Rd., Chicago 23, Ill. The master station, operating on 110 to 115 volts a.c. or d.c. can call any or all sub-stations and receive an answer. Sub-stations can originate calls to master station by the "Silent Feature." Sub-stations may be installed up to 2,500 ft. from master station whether power supply is available or not.

Anti-Frost Compound 17

A NEW product that stops freezing shut of refrigerator doors and cuts time in defrosting coils has been introduced by Stanco Distributors, Inc., Dept. I, 216 W. 14th St., New York 11, N. Y. Named "Thors," the new product is a soft, greaselike material of creamy white color, that is swabbed or brushed on the clean contact surfaces. The light fluffy frost that forms on the treated surfaces is removed by a light brushing. At room temperature it has a food-like odor that becomes almost imperceptible at zero degrees F.

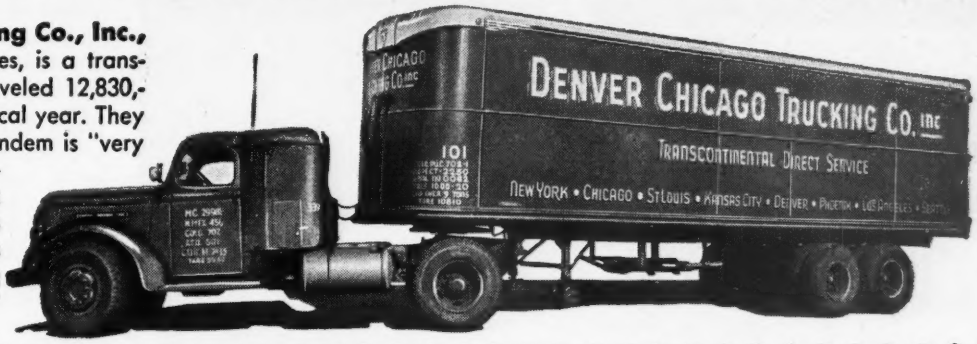
Water Softener 18

A NEW "Filt-R-Stil" water demineralizer has been developed by the Ion Exchange Products Department of American Cyanamid Co., Dept. I, 30 Rockefeller Plaza, New York 20, N. Y. It is designed to transform ordinary tap water into the chemical equivalent of distilled water at a small fraction of the cost of distilled water. It requires no heat, no steam, no auxiliary equipment, and only enough electricity to light a 6-watt bulb. Designed to operate at 60 gal. per hr., it can be used to deliver water

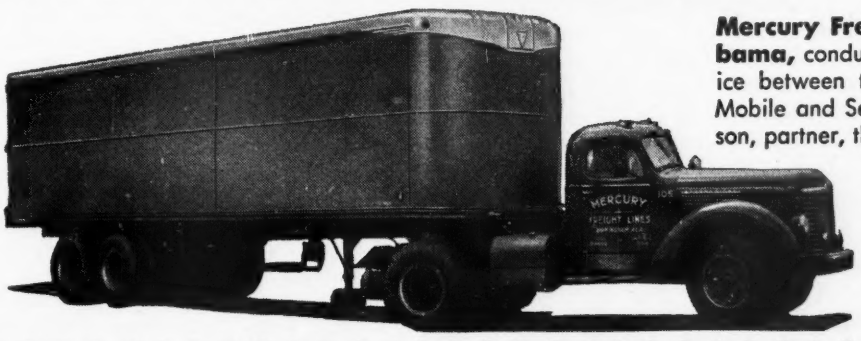


Semi-automatic filler for dry products.

Boss-Linco Division of Lincoln Storage & Cartage Co., Buffalo, is the "over-the-road" division operating as a common carrier of general commodities in the states of New York and Pennsylvania, within 200 miles of Buffalo. Mr. Charles J. Palisano, partner, says "Trailmobile's tandem is most satisfactory . . . Trailmobiles have proved far stronger, more economical than other trailers for common carrier service."


DENVER CHICAGO TRUCKING CO. INC
TRANSCONTINENTAL DIRECT SERVICE
NEW YORK • CHICAGO • ST LOUIS • KANSAS CITY • DENVER • PACIFIC
101

Denver Chicago Trucking Co., Inc., Denver, covering 22 states, is a transcontinental carrier that traveled 12,830,-648 miles during the last fiscal year. They use 80 Trailmobiles. The tandem is "very good, very well constructed," states Mr. Felix Cohen, Vice-President. He is also convinced Trailmobiles are "the easiest-pulling trailers, save gasoline, tires."



Mercury Freight Lines, Birmingham, Alabama, conducts an efficient common carrier service between the Alabama cities of Birmingham, Mobile and Selma. According to Mr. J. H. Anderson, partner, they consider all of their Trailmobiles to be "outstanding trailers." He feels that the newly developed, simplified tandem is an important reason for Trailmobile superiority. Other advantages: "excellent" service and lower operating cost.

For Sensational New Developments Like The "Rocking-Beam" Tandem . . .

The Trend is to TRAILMOBILE

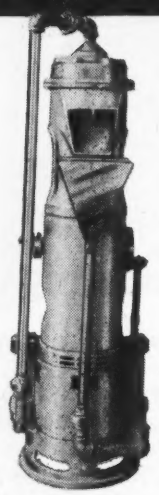
Another Trailmobile first! Trailmobile has built a new tandem employing entirely new principles. The secret? Two simple "rocking-beams" equalize loads on both axles, reduce number of moving tandem parts from twelve to only two. All parts are standard . . . interchangeable . . . available "everywhere." This simplified Trailmobile tandem sharply decreases lubrication and upkeep costs and permits heavier payloads through the use of a really effective, practical tandem arrangement.

Just look at a new Trailmobile. You'll see a basically improved undercarriage; new structural advances like the "diamond" construction of the sides; a 50% more efficient prop . . . plus other trailer improvements which mean lower upkeep and maintenance costs. No wonder hundreds of carriers like those quoted above are following the nation-wide TREND TO TRAILMOBILE.

A coast-to-coast network of 73 Customer Service Centers is ready and willing to demonstrate to you in detail all the many advantages of Trailmobile performance. There's a Center near you. Why not call on a friendly Trailmobile Branch today?

THE TRAILMOBILE COMPANY • CINCINNATI 9, OHIO

HIGHER CAPACITY... BETTER PRODUCTION in a fraction of the space!



GRINDING
EMULSIFYING
HOMOGENIZING
MIXING
DISPERSING
DISINTEGRATING

Stainless Steel

MOREHOUSE HY-R-SPEED MILL

MODEL SS-20

Requiring a space only 20" in diameter x 5' in height, the new Morehouse SS-20 Mill produces up to four times as much as ordinary mills—better and more efficiently. Specially designed for food processing, it is highly efficient on a wide variety of materials.

Modern design and scientific engineering produce smooth, dependable and economical operation. Noise and vibration are negligible. Adjustment for various types of grinds can be made without stopping. No special foundation is required for mounting.

The unit is available with or without pump. When this feature is desired a power take-off from the motor permits installation of pump as illustrated.

Priced far below ordinary mills, the Morehouse Hy-R-Speed Model SS-20 will save you substantial amounts both in first cost and in operation.

Write for full information.

MOREHOUSE INDUSTRIES
1156 San Fernando Rd.,
Los Angeles 31, Calif.
Since 1898

Demineralizer delivers 60 gal. water per hr.

containing a maximum of 10 ppm. of ionized solids—or as little as 1 ppm. A built-in controller indicates the actual quality of all treated water; no auxiliary analytical tests required.

Gate Valve 19

ESPECIALLY adaptable for installation where space is limited, the new "Murco" quick opening gate valve that can be operated in a fraction of the time required for a screw valve is announced by D. J. Murray Mfg. Co., Dept. I, Wausau, Wis. Made in all cast iron, cast iron with bronze gate, or all bronze, this valve is designed so that it is narrow from face to face of flanges. The gate is easily removed from the valve without disconnecting the valve from the pipe line. Made in 6, 8, 10, 12 and 16 inch sizes.

Popcorn Vendor 20

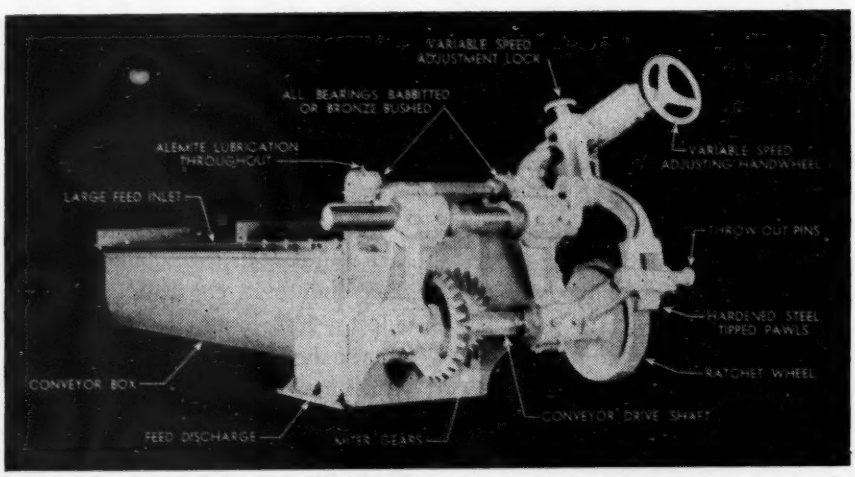
MINIT-POP, an automatic coin-operated popcorn vender is announced by The Viking Tool & Machine Corp., Dept I, Belleville 9, N. J. Insertion of a coin actuates machinery which brings from a storage tank and dumps into an oscillating popping basket a measured cup of raw corn. The basket rests in a batch of hot seasoning oil in which the corn is actually popped. At the end of the time cycle the basket is mechanically lifted into a dumping position and the popcorn is cascaded into a waiting bag. The entire cycle takes about 75 sec. The machine is all ready to pop, regardless of the time intervals between cycles.

Vacuum Unit 21

A HYDRO-STEAM vacuum unit that requires only a small amount of make-up water to maintain vacua in ranges up to 1 mm. is produced by Schutte & Koerting Co., Dept. I, 12th and Thompson Sts., Philadelphia 22, Pa. Units are available in six sizes with a water jet vacuum pump and 1-, 2- or 3 stages of steam jet boosters. Capacities range from 1.6 to 13.5 lb. air per hr. The steam jet exhausters operate in series and discharge into a water jet exhauster which serves as a steam condenser and low vacuum stage jet. Water discharges in a specially designed chamber where non-condensable gases are liberated and the water stored for re-use. Water is recirculated by a small centrifugal pump. To maintain the vacuum a small amount of make-up water is continuously added.

Feeder Drive 22

A FEEDER drive that will handle the extra load and high capacities required by most wide mouth feed bins is announced by Sprout, Waldron & Co., Dept. I, Muncy, Pa. It is a self-contained unit, easily and quickly installed, that bolts directly to the conveyor box and requires no intermediate coupling. Wide babbitted and bronze bushed bearings seat large diameter drive shafts. An accurate and convenient speed adjustment mechanism provides an even, continuous rate of discharge. The heavy steel-tipped pawls and wide non-slip ratchet wheel assure extra service.



Heavy-duty, variable speed feed drive bolts directly to end of conveyor box.

Air Filter 23

A FILTER dripwell primarily designed to remove oil fog from instrument supply air is announced by Moore Products Co., Dept. I, H and Lycoming St., Philadelphia 24, Pa. The filtering material is contained in an open-end brass cylinder which is mounted in a brass housing. Air enters the top of the inner cylinder, passes down through the filtering material and up between the cylinder and housing. Trapped oil and moisture are retained in the bottom chamber until blown off. The unit is 2⅛ in. in diameter by 9 in. long. The ¼ in. pipe connections are in line.

Hand Sealer 24

AN inexpensive instant hand heat sealer, especially designed for use with heat sealing films, foils and papers, has been introduced by the

Bags heat-sealed with hand electric sealer.

Dobeckmun Co., Dept. I, Cleveland, Ohio. It weighs only 14 oz., and is held easily in the palm of the hand. Made of brown molded plastic, it may be plugged into any convenient light socket for continuous operation after 5 min. heating time. An automatic temperature control with built-in thermostat holds the heat at approximately 260 deg. F. Requires only 150 watts to operate. A tough, heat resistant white plastic cover on the cast aluminum sealing jaws prevents gumming and sticking.

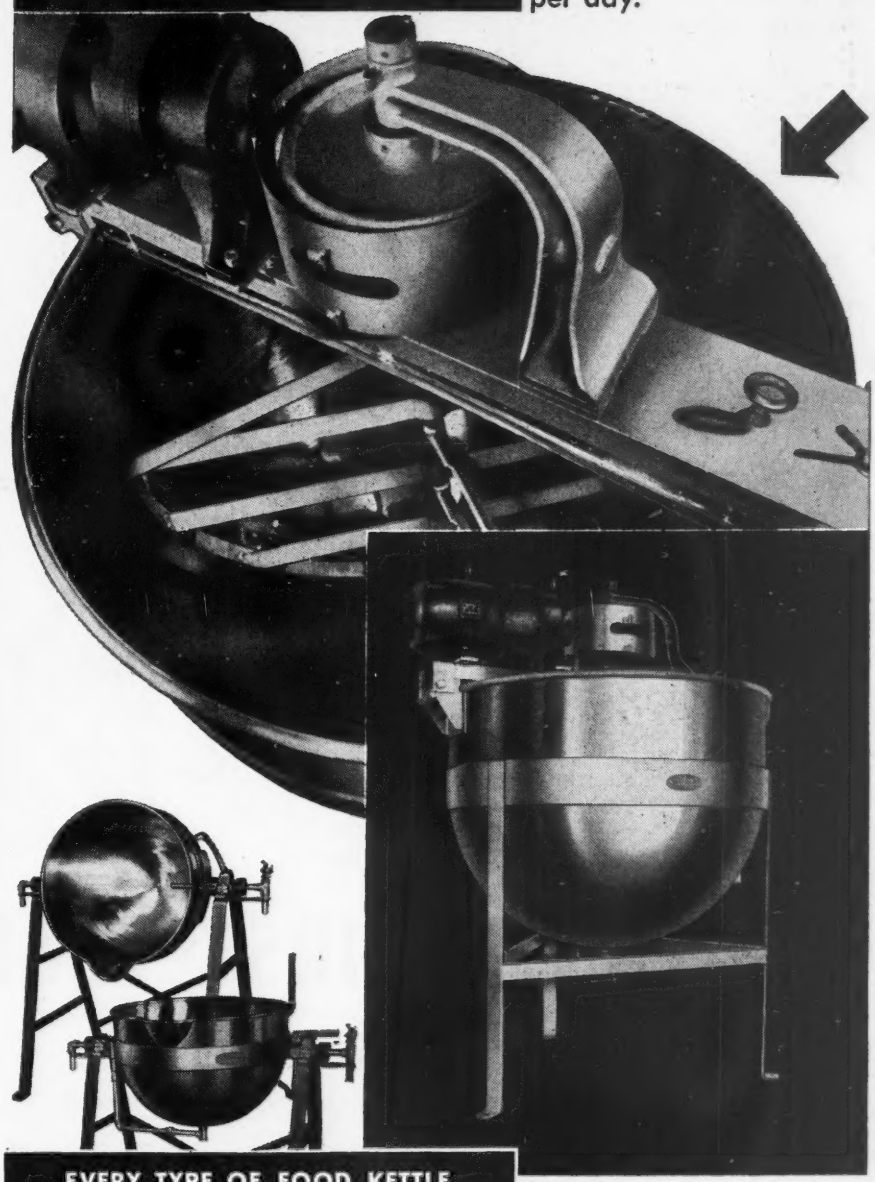
Water Treatment 25

A NEW water treatment machine which combines mixing of chemicals with raw water, turbidity removal, and storage of treated water all in one unit has been developed by The Permutit Co., Dept. I, 330 W. 42nd St., New York 18, N. Y. The unit may be used for removal of turbidity and color alone, or as a combination de-

There's nothing complicated or mysterious about the construction or value of Hamilton kettles, but at every point they show knowledge of food men's needs and the skills that alone can produce such good equipment. No finer kettles are made—none are a better investment. No other kettle will stand up longer for less per day.

LOOK INTO MIX-COOKING

THE HEART OF FOOD PROCESSING



EVERY TYPE OF FOOD KETTLE

Hamilton Mix - Cookers and kettles of all types are fabricated in all metals and in any size, standard in design or engineered to the job. Our heavy production brings costs down.

Send for descriptive Hamilton Kettle Bulletins. Describe the mixing or cooking job to be done. We'll recommend properly engineered equipment.

LOOK FOR

Hamilton Mix-Cookers and all other Hamilton kettles are made only by Hamilton Copper & Brass Works, Inc., Hamilton 2, Ohio. EST. 1876

THE KETTLE WITH THE HAMILTON NAME

For Insulation Jobs, too

IT HAS TO BE RIGHT THE FIRST TIME

When it comes to insulations, "nearly right" is wrong!

That's why it pays to get J-M Rock Cork . . . standard of the refrigeration industry for years!

Basically mineral in composition, Rock Cork has low thermal conductivity, plus high resistance to moisture, vermin and rot.

Remembering that insulation will only render its maximum efficiency when properly applied, Johns-Manville also offers an application service of skilled construction units. These units are organized to handle every detail of your insulation requirements from plans to finished job.

For details about Rock Cork, write for brochure DS-555, or get in touch with your J-M Insulation applicator. Johns-Manville, Box 290, New York 16, N. Y.

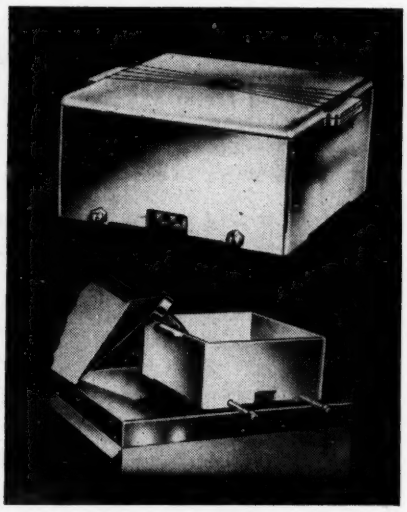
JOHNS-MANVILLE JM PRODUCTS

Johns-Manville ROCK CORK

alkalizer and turbidity remover. The only alteration necessary is the use of one chemical feed tank instead of two. During either process the water is sterilized. Water thus treated and passed through a Neutralite filter, which removes any remaining floc, and an activated carbon purifier for removal of taste and odor, emerges as the perfect beverage water.

Cooking Fat Filter 26

A NEW, compact, easy to operate, low-cost filter that will remove all particles of burned food and sludge, reduce acids and control other impuri-



Aluminum filter cleans, saves cooking fat.

ties produced in cooking or during frying processes is announced by the Delpark Co., Dept. 1, 366 6th St., Lebanon, Ind. The unit is simply and sturdily constructed of cast aluminum. To clean or filter used fat, a paper filter tray is placed in the unit and a small quantity of special filtering material is poured into it. Oil or fat is then filtered through the bed which both adsorbs and absorbs sludges and acids, at the same time removing burned pieces and sediment. The fat may be filtered into a container or back into the fryer or cooking vessel. Removal of the used filter tray and substitution of a new one with fresh Dellite makes the Fat Saver again ready for use. An electric heater is supplied with the unit to prevent fat or oil from cooling before the filtering is completed.

Powered Hand Truck 27

A NEW variation of the electrical powered hand truck, which permits the load to be lifted to considerable heights from the floor for stacking and picking up from elevated docks, racks or tailgates is known as the Yale High-Lift Platform Model Worksaver. It is manufactured by The Yale & Towne Mfg. Co., Dept. I, 4530 Tacony St., Philadelphia 24, Pa.

Two models are already available: one with a platform which can get under a 7-in. skid and hoist it to a

REPUBLIC TOOK THE FOOD ALLERGIES OUT OF FOOD HANDLING BELTS

RUBBER CONVEYOR BELTS can be very allergic to the foods they are expected to handle. In such cases, vegetable and animal fats and oils, fruit acids, heat and other elements attack the rubber; deterioration cuts short the service life of the belt, objectionable tastes and even foreign particles are imparted to foods. Republic, long engaged in specialized service to the food industry, years ago put its technologists to work on the problem. Pioneer developments in conveyor belting with rubber compounds that are inert to specific food substances were the result. Continuing research gives Republic Conveyor Belts, today, more advanced properties of resistance to operating conditions of food processors, ability to meet every service requirement throughout long belt life.

REPUBLIC RUBBER

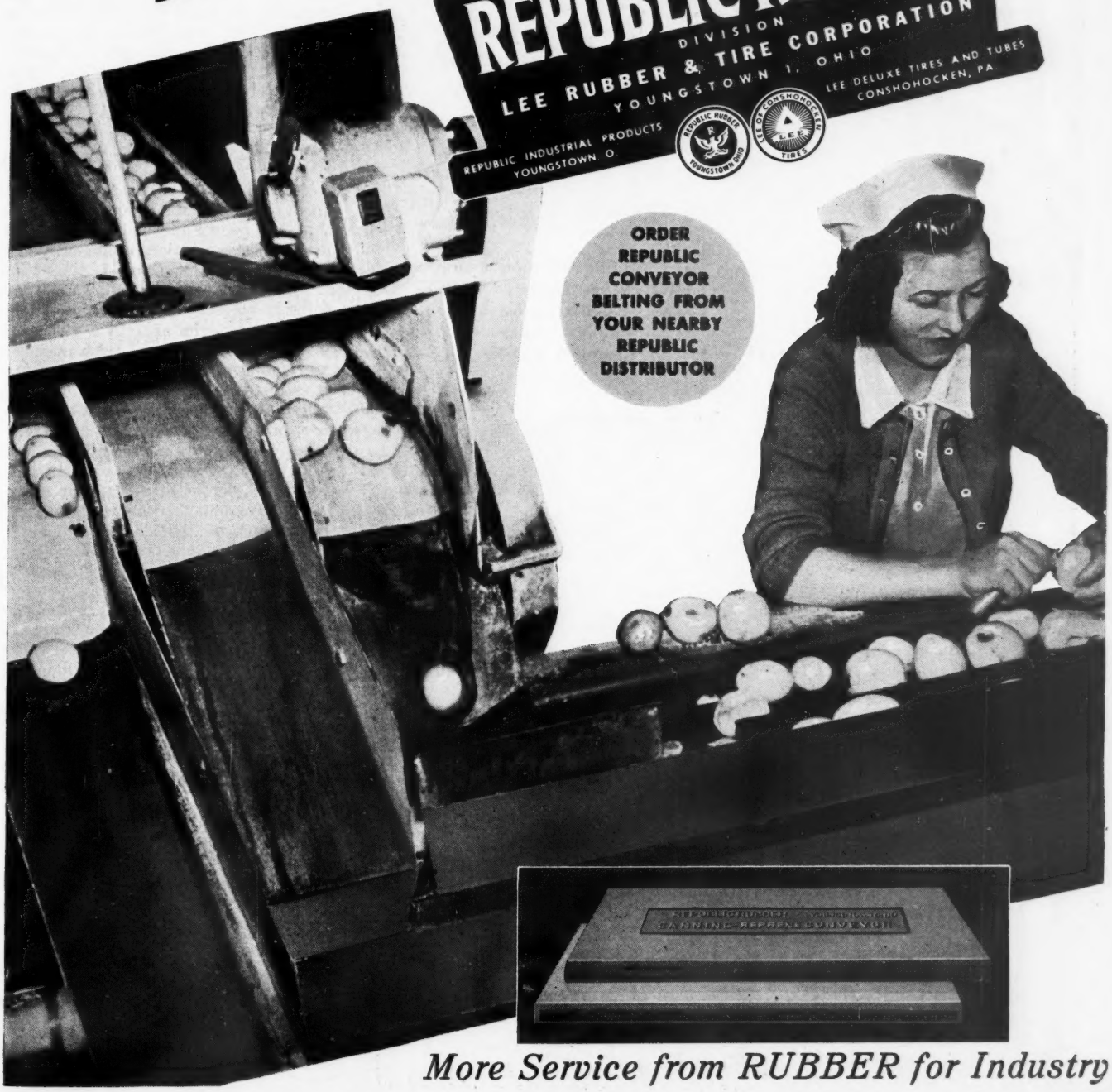
DIVISION

LEE RUBBER & TIRE CORPORATION

YOUNGSTOWN 1, OHIO

REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN, O.

LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN, PA.



More Service from RUBBER for Industry

HUBBERT

Manufacturers of Fine Kettles

All Hubbert Kettle Shells are seamless, die drawn from one single sheet. Shells have no welds to crack, corrode, contaminate or leak

SEAMLESS SHELLS

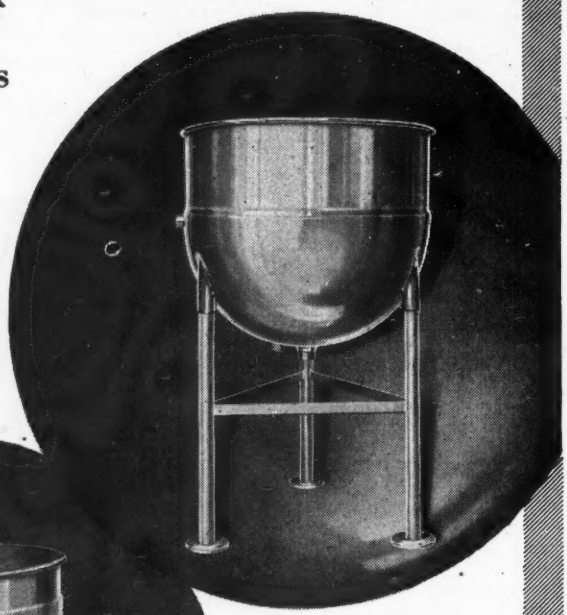
SUPER QUALITY

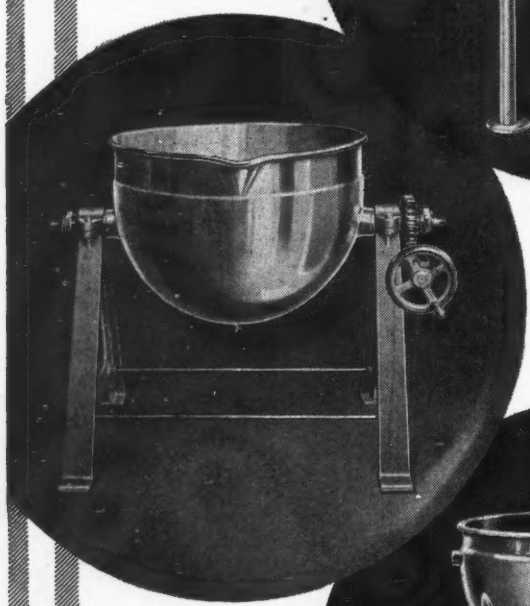
EFFICIENT

SANITARY

DURABLE

SAFE





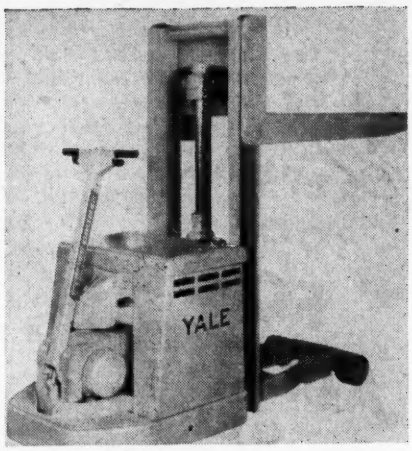
Hubbert Seamless Drawn Steam Jacketed Kettles are *first* choice with the nation's *finest* Food, Chemical and Drug Processors.

Tanks
Valves
Kettles
Agitators
Special Equipment to *Your* Design in *Stainless Steel* . . *Nickel* . . *Monel*

Hubbert Kettles built to ASME & CANADIAN Codes. Request certificates when ordering.

B. H. HUBBERT & SON, Inc., 1311 South Ponca St., Baltimore 24, Md.

E. G. JAMES CO., 316 So. La Salle St., Chicago 4, Ill.
Exclusive distributor, Hubbert equipment to meat packers.



High lift fully-powered hand truck.

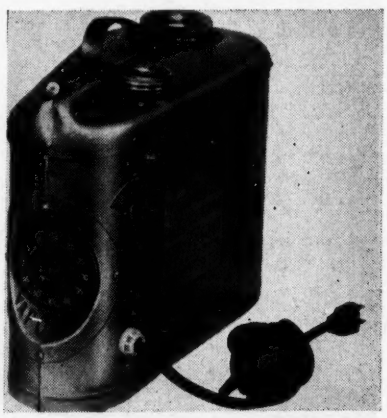
height of 66½ in.; the other with a platform which can get under an 11-in. skid and lift it to a height of 70½ in. Both models have a lifting capacity of 4,000 lb. The units can turn a right angle within 91 in., need only 54 in. aisles, and can swing within a circle of 95 in. radius. They can negotiate at 9 percent grade without hanging up.

Flexible Gas Tubing 28

A FLEXIBLE gas tubing equipped with quick couplings at either or both ends, that has been approved by the American Gas Association, is made by Carbo-Flex Hose Co., Dept. I, 5452 Vineland Ave., N. Hollywood, Calif. The tubing, called Carbo-Flex, comes in standard lengths of 1 to 6 ft. and in practically any other length on order, and from ¼ to 1¼ in. in diameter. It is lined with Neoprene, and may be ordered in stainless steel, monel, bronze, brass, copper, aluminum or other metals. When made of aluminum or copper, it will withstand up to 600 lb. hydraulic or air pressures. When made of other materials it withstands up to 1,200 lb.

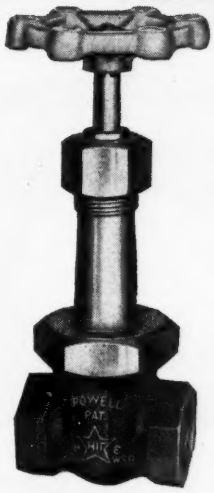
Insecticide Sprayer 29

A COMPLETELY automatic electric insecticide sprayer, the Vapomat, that will achieve a positive kill of all flying insects in an area of 500,000 cu. ft. with one filling of Vaposector Fluid, is announced by West Disin-



Automatic electric insecticide sprayer.

Powell Valves have served Industry
...and served it well.



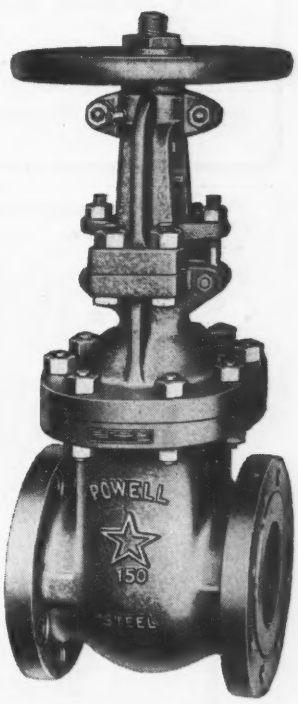
Small size 200-pound Bronze Gate Valve for steam, water, oil or gas. Has inside screw rising stem, union bonnet and renewable, wear-resisting "Powellium" nickel-bronze disc.

'Way back in the "horse and buggy days", the first regrinding globe valve was produced and patented by Powell. And ever since then Powell has been a leader in the field of industrial flow control equipment.

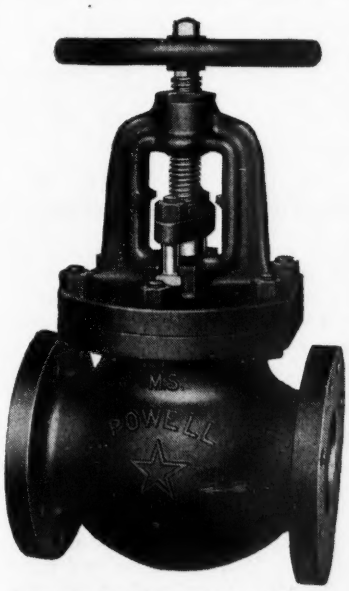
As amazing as the changes in methods of transportation have been since 1846, the progress of industry has been well nigh incredible.

Through more than a century of keeping pace with the flow control requirements of each new industrial development, Powell has built such a complete line that today there's a Powell Valve to meet every demand of modern industry.

The Line now includes Bronze and Iron Valves of every required type, design and size; Cast Steel Valves of every type, in pressure classes from 150 to 2500 pounds, inclusive. And, to meet the demands of the Chemical and Process Industries for corrosion resistant valves, Powell makes a complete line, including many special designs, in the widest range of pure metals and alloys ever used in making valves.



Class 150-pound Cast Steel Gate Valve with bolted flanged yoke, outside screw rising stem and taper wedge solid disc.



Large Iron Body Bronze Mounted Globe Valve for 125 pounds W.S.P. Made in sizes 2" to 16", inclusive. Has outside screw rising stem, bolted flanged yoke and regrindable, renewable bronze seat and disc. Also available in All Iron.

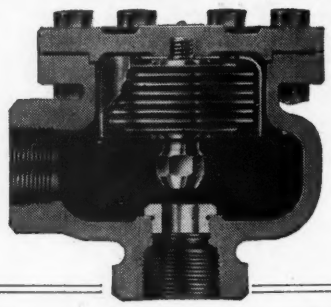
The Wm. Powell Company, Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

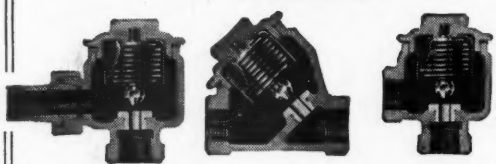
Facilitate Heat Control

with Nicholson
"POSITIVE ACTION"
STEAM TRAPS

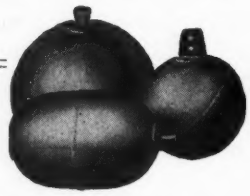


Featuring 2 to 6 times average drainage capacity, as well as freedom from air-binding, freeze-ups and water-logging, Nicholson traps afford a positive fast action that increasingly recommends them for improving heat control in food processing.

BULLETIN 544 or see Food Industries Catalog



Nicholson thermostatic steam traps are furnished in 5 types for any processing application. Sizes ¼" to 2"; pressures to 225 lbs.



High-pressure floats in all sizes, shapes. Bulletin 746.

W. H. NICHOLSON & CO.
193 OREGON ST., WILKES-BARRE, PA.

COLD STORAGE is OUR business

Ship to one of the South's leading cold storage and freezer warehouses to insure proper care for your foods.

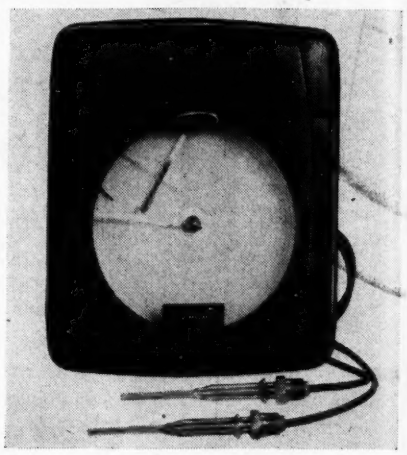
Write for fully illustrated folder.

Roanoke Ice & Cold Storage
ROANOKE, VIRGINIA

fecting Co., Dept. I, 42-16 West St., Long Island City 1, N. Y. It is housed in a hammered aluminum case weighing 8 lb. Operates on a. c. or d. c. An automatic shut-off prevents burn-outs. A new dial control regulates volume of dispersal.

Timer 30

A DYNALOG electronic timer for high temperature short-time pasteurizing of milk is announced by The Foxboro Co., Dept. I, Foxboro, Mass. The timer is not a control instrument; it was designed especially for the measurement of the actual time in which milk travels through the holding tube, and the temperature of the milk during that time. Measurements are made by means of two resistance bulbs located, respectively, at the inlet of the holding tube and just ahead of the diversion valve.



Timer for H.T.S.T. pasteurization of milk.

Frozen Food Dispenser 31

SEVERAL major improvements in their latest model of double-duty frozen food dispensers, including an improved set-back base and double gasketed doors are announced by The Spir-O-Freez Company, 1077 Castleton Ave., Staten Island 10, N. Y. The dispenser has patented gravity-feed display chutes, which keep frozen food packages perfectly displayed throughout the day without any attention on the part of the store owner. It is an open-trough design with a full length mirror and fluorescent lights. Construction is of the finest enamel and stainless steel, with heavy-duty hardware, maximum insulation, and storage capacity.

Adhesive 32

A NEW, all-purpose labeling and protective coating adhesive that offers all-weather identification is now available from National Adhesive, Dept. I, 270 Madison Ave., New York 16, N. Y. It can be used both as an adhesive and as a protective label coating.

CATALOGS, BULLETINS

This digest of manufacturers' new publications is offered by FOOD INDUSTRIES Reader Service as a convenience for executives. The editors feature catalogs, data sheets and technical pamphlets likely to interest purchasing agents, superintendents, packaging men and food technologists.

Food Plant Equipment

Food Machinery 51

Food Machinery Corp., Sprague-Sells Div.—New 260-page general catalog No. 800, illustrating and describing the company's line of modern food processing and canning machinery and supplies. Includes sections on the FMC frozen food carton filler, high speed line for processing tomato juice, new lines for spinach and root vegetables and a complete new warehouse line including labelers, casers, can unscramblers and case sealers.

Process Equipment 52

Vulcan Iron Works—Bulletin A-442. 28-page booklet illustrating and describing the process equipment made by this company, which includes rotary kilns, coolers, and dryers. Discusses the application of this equipment to various industries. Contains data on features of construction, and installation drawings.

Grinders 53

The Williams Patent Crusher & Pulverizer Co.—Bulletin 623 is a 12-page booklet featuring the crushers, grinders, shredders, pulverizers, granulators, air-separators, mills and screens manufactured by this company. Various types of equipment are illustrated with photographs and diagrammatic sketches which show features of construction, operation and application.

Mixers 54

B-P Mixers is the title of catalog No. 47 by Baker Perkins, Inc. In two colors, it illustrates and describes the most recent developments in mixing and kneading machines, including micro, vacuum, universal and dispersion mixers.

Tanks 55

Lee Metal Products Co., Inc.—New 4-page bulletin No. M-4, describing Lee round storage and mixing tanks designed to store or process hard-to-handle products such as acid fruit juices, vegetable and meat stocks, brines, sirups, and chemicals.

Refrigeration Units 56

Worthington Pump & Machinery Corp.—Bulletins on Freon-12 refrigeration units with air-cooled and water-cooled condensers in sizes from ¼ to 2 hp. Contain complete descriptions and specifications.

Slicers and Wrappers.....57

Gellman Mfg. Co.—Illustrated folder describing the various models of automatic bread slicers and wrappers manufactured by this company.

Speed Selector 58

B. F. Goodrich Co.—Broadside on new Variable V-Planetary infinite ratio speed selector suitable for agitators, bottling machines, candy making machinery, conveyors, cookers, driers and food processing machinery. Featured is a page outlining with illustrations the engineering principles of the speed selector's operation, and another which lists dimensions, horsepower and torque ratings of the three models available in ½, 1 and 2-hp. output.

Comminuting Machines 59

The W. J. Fitzpatrick Co.—Folder on the Model J. Homoloid Machine for preparing stable emulsions and colloidal suspensions. Also folder on Model D Comminuting Machine for processing both wet and dry materials. Contains illustrations of assembled and disassembled machine, description, technical specifications, and list of uses in the baking, canning and food packing, dairy and confectionery industries.

Dust Collectors 60

The Thermix Corp.—Catalog 101 is a 12-page illustrated booklet featuring the Aerotec industrial dust collectors. Details of design and performance are given, and diagrammatic sketches illustrate the construction details. Dimensions and capacities of the various sizes are tabulated. Catalog 200 contains 20 pages featuring the Prat-Daniel stacks and dust collectors in the process industries. Various types of equipment, such as fans, cyclones, stacks and dust collectors are illustrated and described. Catalog 10 is a 12-page bulletin giving the features and advantages of Heacon dampers for controlling flow.

Ventilating Fans 61

The Moore Co.—Folder on the Moore Series 16 direct motor drive ventilating fan in sizes from 36 to 60 in. Illustrated with line drawing and table of specifications. Also folder on the Moore direct drive axial flow pressure blower for volumes up to 100,000 cfm. Contains illustrations, descriptions, sizes, capacities and applications.

Bread Wrapping 62

A new 12-page circular by American Machine & Foundry Co., "Dependably Wrapped," gives reasons for the general acceptance of AMF standard bread wrapping machines in over 1,900 bakeries throughout the country. Complete with dimensions, floor plans and detailed specifications, plus comprehensive descriptions of the end labeler attachment, mechanical loaf ejectors, variable speed drive and other improvements.

Deaerators 63

Elliott Co.—20-page bulletin N-15 describing and illustrating the deaerating equipment made by this company. Contains a discussion of why corrosion makes deareation of feedwater necessary. Principles of deaeration are described in detail and the various types of equipment used in this process are illustrated.

Motors 64

The advantage of totally-inclosed motors, of both the fan-cooled and the non-ventilated type, for application to machine tools, are described and illustrated in a new 8-page bulletin, MU-25A, by Wagner Electric Corp.

Pharmaceutical Equipment 65

F. J. Stokes Machine Co.—28-page catalog No. 480 T on "Stokes Pharmaceutical Equipment." Shows new and improved tablet compressing machines and auxiliary equipment, contains added information on punches and dies and briefly describes freeze-drying equipment. Also mentions certain vacuum processing equipment.

Steam Generators 66

Preferred Utilities Mfg. Corp. — 2-color, 8-page bulletin No. 1000-E describing in detail Preferred self-contained, oil-fired, steam generating plants of 4-pass induced draft construction, in sizes from 40 to 500 hp.

Magnetic Pulleys 67

Magnetic Engineering & Mfg. Co.—12-page catalog No. 146 illustrating and describing the Memco high power magnetic pulleys made by this company. Operation and application of both the air cooled and solid pulleys are described and illustrated. Design and construction details are tabulated as are the weights, capacities and dimensions.

Magnetic Separators 68

The Homer Mfg. Co., Inc.—4-page folder illustrating typical Homer permanent magnetic separator applications for manufacturing and processing industries, such as foods, liquids, seeds, grain and chemicals.

Jet Pumps 69

A simple method of determining the correct type of jet pump for the user's individual requirements is a feature of bulletin No. 315 by Derbyshire Machine & Tool Company. It details the manner in which this line of jet pumps, utilizing water under pressure as the pumping medium, is used in removal, transfer, or mixing of liquids, heavy sludges, process wastes. Includes charts and tables.

Refrigeration Equipment 70

Bell & Gossett Co.—A number of loose-leaf data sheets on refrigeration equipment. No. AA-147, "Shell and Tube Ammonia Condensers." No. AC-147, on evaporators and condensers. No. Y-147 and Z-147, single sheets on shell and

HOW TO GET THIS LITERATURE

Food Industries Reader Service now supplies tear-out coupon cards for your convenience in requesting copies of these new publications from manufacturers. Use one or more of the cards on the colored sheet bound opposite this page. Fill out, tear out, mail out and the Reader Service staff will see that your requests reach the manufacturers.

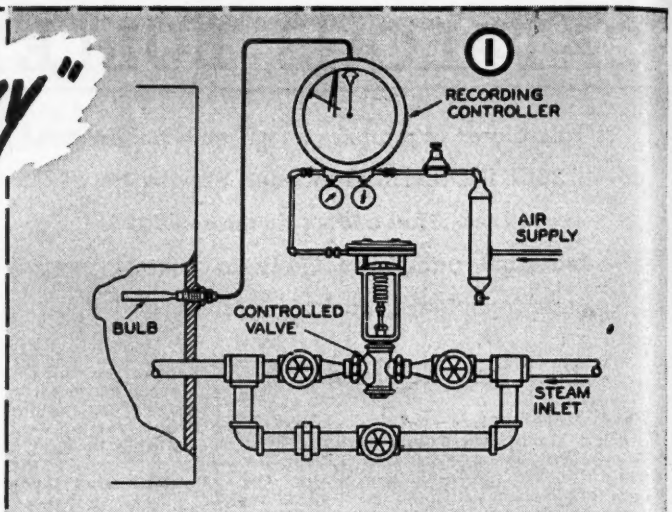
You get the "Gravy"

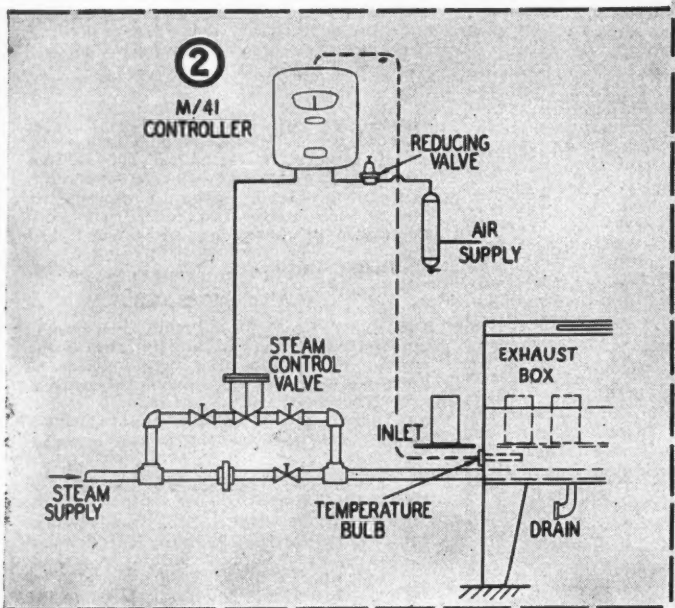
... when

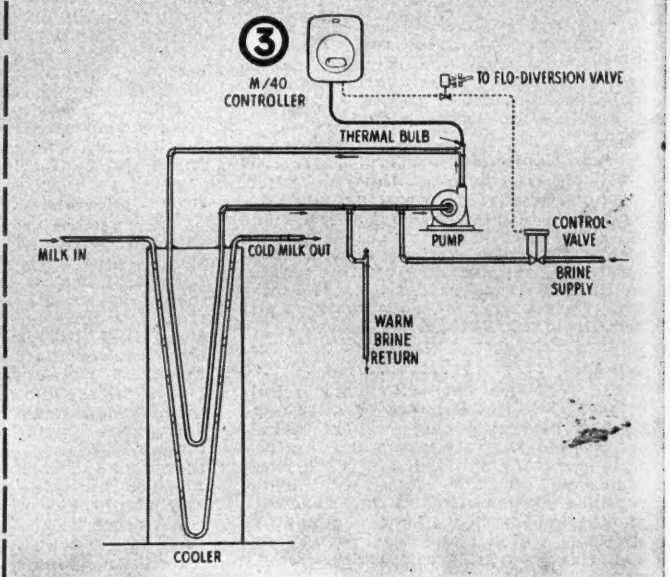
AUTOMATIC CONTROL

is FOXBORO ENGINEERED

REG. U. S. PAT. OFF.







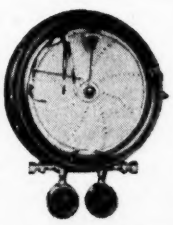
EVEN FOR A SIMPLE CONTROL INSTALLATION, Foxboro always recommends an instrument engineered to the specific type of job to assure full advantages of automatic control ... more production, better and more uniform quality, less spoilage, lower overall costs. Over-control represents a needless waste of money. Under-control, a disappointment in results.

Nearly 90% of all food processes can be adequately handled by simple on-off control—providing the controller's action is virtually free of throttling effect. This perfected control is found only in Foxboro On-Off Controllers. Other processing operations may call for either proportional control or proportional (Stabilog) control with Hyper-Reset. *Foxboro offers all 3 types!*

Be sure to get the "gravy" ... your full share of every advantage represented by automatic control. Count on it from Foxboro. **The Foxboro Company, 30 Neponset Avenue, Foxboro, Mass., U. S. A.**

1 FOXBORO ON-OFF CONTROLLER

This simple recording controller turns heat on or off to maintain desired temperature. Typical application: smokehouses, canning retorts, bakery proofrooms, ham, jam, candy kettles, dehydrators.

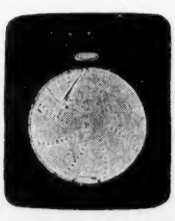


2 FOXBORO MODEL 41 CONTROLLER

On-off (or proportional). Ideal indicating controller, moderately priced. For exhaust boxes, cooling canals, eye peelers, water heaters, continuous dehydrators, canning and similar processes.

3 FOXBORO MODEL 40 CONTROLLER

On-off, proportional or (Stabilog) proportional with Hyper-Reset action. Gives matchless performance on H.T.S.T. milk pasteurizers, continuous pasteurizers, heat exchangers and like processes.



FOXBORO
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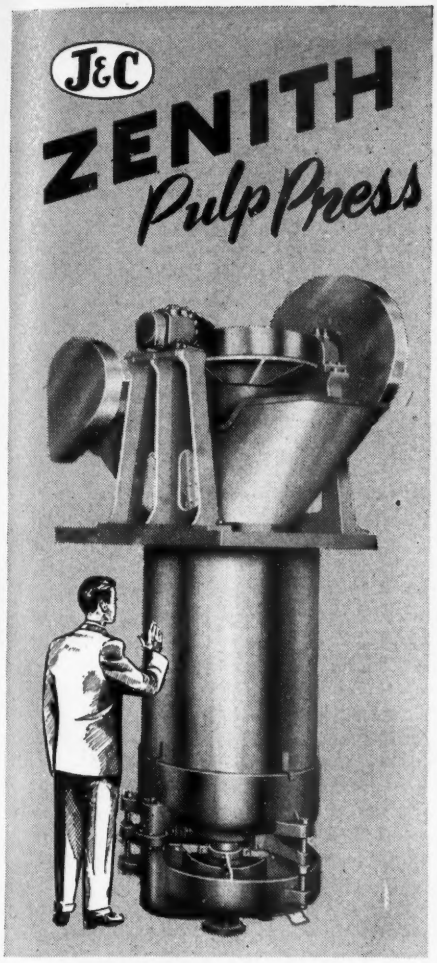
RECORDING · CONTROLLING · INDICATING
INSTRUMENTS



INCREASES
PRESSING EFFICIENCY
RECOVERS
EXTRA PROFITS

100% automatic . . . from storage bin to finished product . . . the Zenith Pulp Press dewaters up to 26 tons of wet pulp or slurry per hour.

In a continuous operation, material is conveyor-fed to a screw-type spindle that compresses and feeds it through the press.

Heater resistors keep pulp constantly rolling over and assure maximum dewatering by offering new pulp surfaces to drainage screens. Resistors are rifle drilled for steam injection . . . permitting heating of pulp while under pressure.

Finished material is conveyed from the press by means of a screw or belt conveyor . . . completing an entirely automatic process.

New uses for the Zenith Pulp Press are being discovered every day. Among the many installations for dewatering are: BEET PULP • PINEAPPLE • TOMATO POMACE • CORN GERM and FIBRE • VEGETABLES • BREWER'S GRAIN • CHERRIES • CITRUS FRUITS • FISH • PAPER PULP • RECLAIMED RUBBER • TANKAGE • ETC.

A Pilot Press is available for trial in your plant.

"Work Well Done Since '81"

A PRODUCT OF
Jackson & Church Co.
SAGINAW, MICHIGAN

finned freon condensers. No. AD-147, 4 pages of engineering data on refrigeration condensers and liquid receivers. Also No. R-846, on Clean-A-Coil valve for indirect and direct-fired water heaters. Shows construction and operation of the valve.

Materials Handling

Lift Trucks 71

Towmotor Corp. — An illustrated booklet featuring the use of fork lift trucks in handling materials in a plant which manufactures glass jars, bottles, seals and caps.

Elevators 72

"Revolvator Products" — a 50-page illustrated catalog describing the complete line of materials handling equipment made by the Revolvator Co. Includes portable elevators, freight elevators, stackers, lifters, tiering machines, lift trucks, storage racks and elevating tables.

Boxes and Platforms 73

The Powell Pressed Steel Co.—Bulletin No. 600 describes and illustrates Powell pressed steel lift truck platforms, box and box platform units. Bulletin No. 650 on all-steel and wood pallets. Bulletin No. 700 on special handling equipment for solving warehousing or storage problems.

Control Equipment

Electronic Controls 74

A 20-page, three-color book, "Wheelco Electronic Controls," has just been released by Wheelco Instrument Co. Measuring and control systems; the electronic control principle; Multronic, proportioning, automatic positioning and program control are explained with graphs, diagrams and photographs. Briefness and simplicity throughout makes this a welcome reference book for instrument experts, as well as newcomers. A separate four-page price list is attached.

Millivoltmeter, potentiometer and resistance thermometer controllers, indicating pyrometers, resistance thermometers, input controllers, portable pyrometers, potentiometers and selector switches are shown.

Electrical Equipment 75

Signal Engineering & Mfg. Co.—20-page catalog No. 6 featuring medium duty power relays. Includes information on selection of relays, operating characteristics, contact circuit arrangements, contact ratings and other data on small and medium power relays.

Meters 76

A new 12-page illustrated bulletin No. 35-80B on the ADSCO rotary condensation meter is announced by American District Steam Company. It gives details of construction and installation on seven sizes of meters.

Controls 77

Fenwal, Inc. — "Thermoswitch Controls," a 45-page 2-color bulletin on the many types of controls and accessory equipment made by this company. Illustrated with photographs and line drawings. Contains 6 pages of discussion on selection and applications, also ordering specifications.

Pyrometers 78

Leeds and Northrup Co.—16-page catalog ND 46 (1) describing the Speedomax Type G pyrometers manufactured by this company. The principle of operation is described and a simplified schematic diagram shows the essential parts of this electronically balanced potentiometer instrument. Features

LEAKY ROOF?

Playing catch with roof leaks is always a losing game . . . the score quickly adds up in wasted time as well as damage to your building, machinery and goods.

Don't put up with the high cost of roof leaks in your plant . . . have your handy man repair your roof with **Stonhard Roof Resurfacer.**

There's no heating, mixing or expensive equipment required . . **Stonhard Roof Resurfacer** stops leaks instantly and provides years of protection on any type of roof.

Return the coupon for free roof maintenance guide . . . no obligation.

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Building Maintenance Materials
Serving Industry Since 1922
887 Terminal Commerce Bldg.
Philadelphia 8, Pa.

STONHARD COMPANY
887 Term. Com. Bldg., Phila. 8, Pa.

Please send maintenance guide and information on STONHARD ROOF RESURFACER.

Firm .....

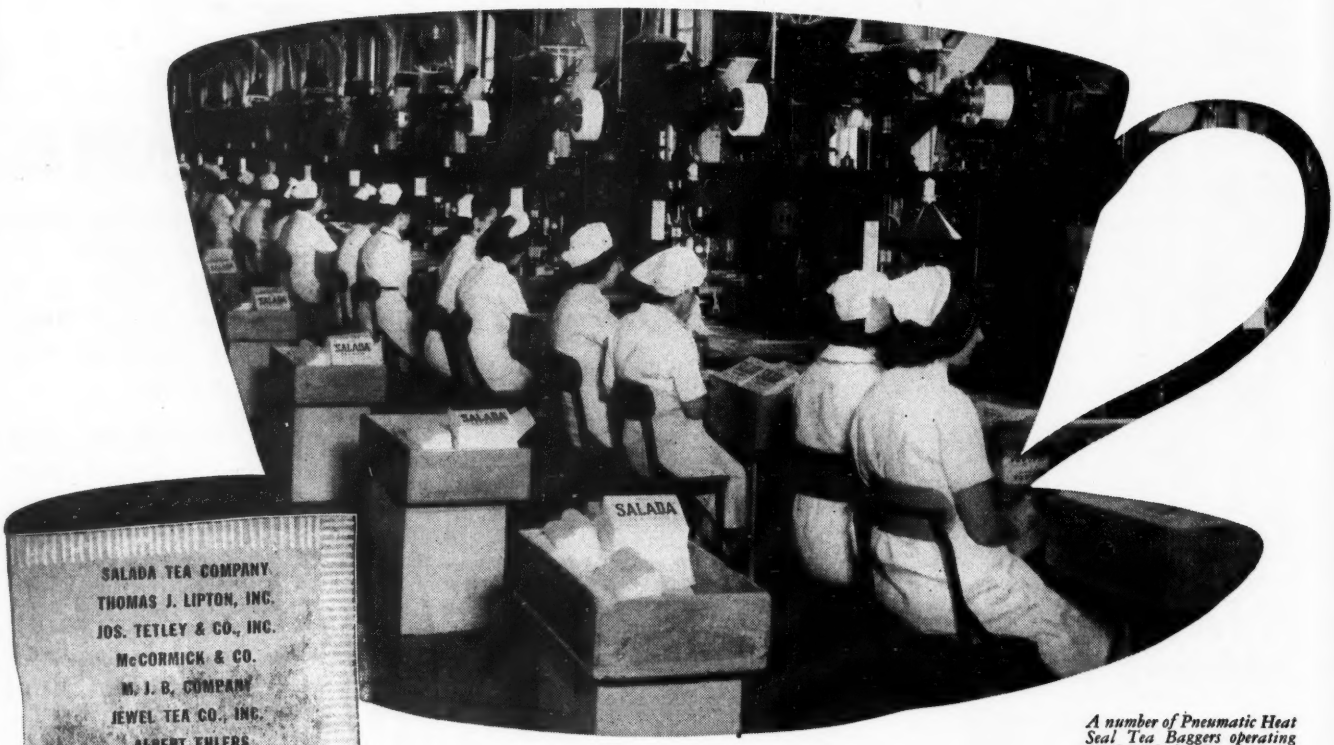
Mr..... Title.....

Address .....

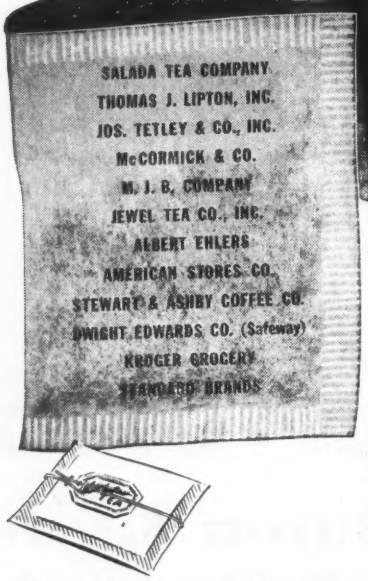
City..... Zone..... State.....

IT'S LITTLE SHORT OF

Packaging Magic



A number of Pneumatic Heat Seal Tea Baggers operating in the Salada Tea Company plant, Boston, Mass.



Pneumatic's tagging mechanism wraps the string around the bag and tucks the tag neatly under. A gentle pull on the tag frees the string and the bag is ready for use.

...DEVELOPED BY PNEUMATIC

AND USED BY THE LEADERS IN TEA!

When the demand for tea in handy bags began to grow, new production problems were created for tea packers. Again Pneumatic met a challenge. Its latest development in the tea field—the Heat Seal Tea Bag Machine—is little short of packaging magic. With ingenuity born of long years of experience Pneumatic engineers dug into their bag of technical knowledge and came up with a machine that delivers, with miraculous smoothness and dispatch, 180 heat sealed tea bags per minute! Then, to make the job complete, they devised a tagging mechanism that can be coupled to the tea bag machine. It not only attaches the string and tag but winds the string around the bag and tucks the tag under it, to eliminate the old annoyance of tangling, once and for all.

The leaders in tea, as well as the leaders in other fields of packaged and bottled products, use Pneumatic machines because their advanced design plus their more precise, more substantial construction means money saving, trouble free performance. Packaging economy naturally results from equipment built to meet Pneumatic's well-known objective of "Lower Cost Per Container" operation.

PNEUMATIC SCALE CORPORATION, LTD., 91 Newport Avenue, North Quincy 71, Mass. Branch Offices in New York, N. Y.; San Francisco, Cal.; Chicago, Ill.; Los Angeles, Cal.

PNEUMATIC

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which provide minimum maintenance and easy installation are illustrated. Specifications for the different models are given.

Plant Supplies

Chlorine 79

"Pittchlor for Machine Dish Washing, for General Sanitation, for Deodorization and Bleaching, for Mold-Growth Destruction and for Disinfecting and a Germicide" is the title of a recent folder by Pittsburgh Plate Glass Co.

Cartons 80

Old Dominion Box Co. — 16-page folder pointing out how many large business houses owe much of their success to the increased volume created by proper packaging.

AntiFoam 81

Technical pamphlet by Dow Corning Corp. that describes the physical properties of DC Antifoam A, outlines various methods for using it, presents the methods used for determining its efficiency and proves, by comparative studies, its economy.

Pliofilm 82

The Goodyear Tire & Rubber Co.—10-page illustrated brochure "The ABC's of Pliofilm Packaging." Discusses Pliofilm and its uses in packaging foods and other products. "How to Use Pliofilm to Protect Frozen Foods," a 10-page booklet giving specific instructions for preparing fruits and vegetables for freezing.

Packaging 83

St. Regis Paper Co.—4-page leaflet illustrating and describing the use of Multi-Wall paper bags in the packaging of powdered materials.

Miscellaneous

Resurfacer 84

Stonhard Co.—"Over Ruts and Holes" is the title of a recently published folder outlining the overlaying or patching of worn concrete, wood, brick or composition floors with Stonhard Resurfacer. The folder answers questions dealing with product uses, advantages, methods of application and material coverages. Several typical finished installations on traffic aisles, floors, platform and outside ramps are described and illustrated.

Engineering Data 85

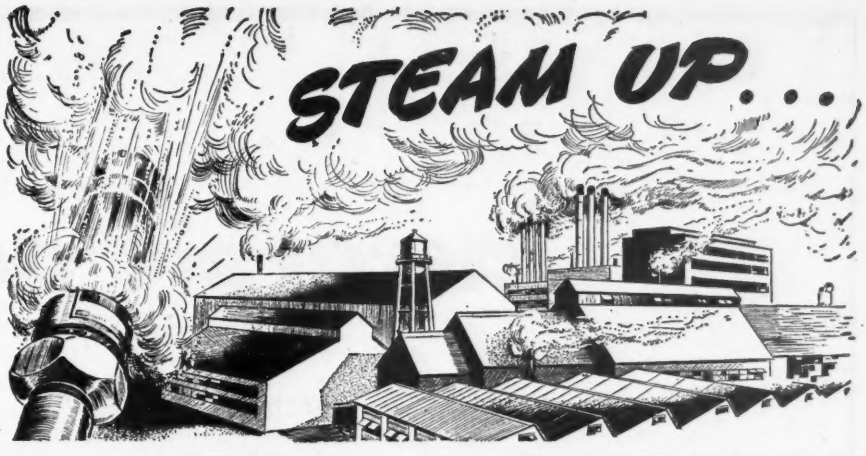
Kramer Trenton Co.—16-page catalog R-114 covering Kramer Engineering Data. Ten pages of refrigeration load calculations for temperatures above and below 32 deg. F., and 4 pages of conversion tables.

Chemicals 86

A new edition of Bulletin 100 has just been published by the Hooker Electrochemical Co. It contains 20 pages of description, physical and chemical properties, graphic formulas, uses and shipping information on Hooker chemicals. Several new products and description of chemical processes and facilities are included.

Silica Gel 87

Davison Chemical Corp. — 12-page booklet entitled "Fundamental Phenomena of Dehumidification." An excellent technical booklet describing basic relationships and physical factors involved in dehumification, and various applications. The action of silica gel for dehumidifying material inside of packages is illustrated by two-color charts.



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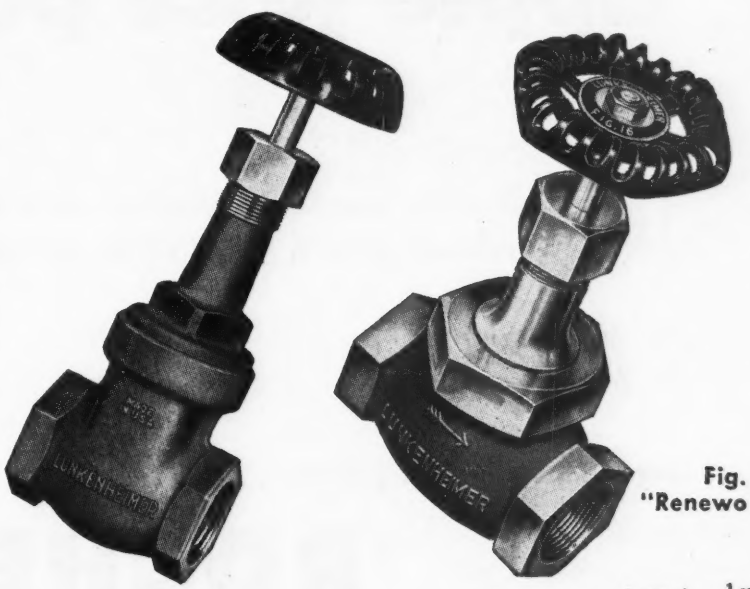

Fig. 16
"Renewo Globe"

Fig. 2125
Bronze Gate

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

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STORAGE

Stored Frozen Egg

INVESTIGATION of factors affecting the quality of stored frozen eggs was made on liquid from the following grades of eggs: Grade A; Grade A held for 16 hr. at 80 deg. F. in sterile glass containers; Grade C; cracked; musty; and eight-day incubator rejects. The liquid egg was frozen within 16 hr. and held at temperatures of 10, zero, and –10 deg. F. for a period of one year. Samples were examined before and after freezing, and after 3, 6, and 12 months' storage. Container materials were Reynolds Metal A-10 cartons, and wax paper. Analyses of whole egg liquid included measurement of pH and reducing sugar; fluorescence, and baking and foaming volume. The tests on baking properties and changes of pH, fluorescence, and reducing sugar content showed the desirability of using Grade A eggs. Storage at the indicated temperatures should be limited to six months, and frozen egg should be allowed to age from 1 to 2 months before use. A highly moisture-resistant barrier should be used at all storage temperatures. Reducing sugar content decreased with increase in the number of bacteria, and this measurement seemed to be a good indication of the quality of liquid and frozen egg.

Digest from "Liquid and Frozen Egg; III, Some Factors Affecting the Quality of Stored Frozen Egg," by J. E. Pearce and M. Reid, *Canadian Journal of Research*, F, 24, 437-444, November, 1946.

PACKAGING

Grease Resistance of Packaging Materials

A VARIETY of packaging materials were tested by a modification of the TAPPI method, in which the time required for red-dyed turpentine to penetrate and stain a piece of white paper is measured. Scores from 0 to 7 were assigned to times varying from 0 to over 18,000 sec.

Results showed that untreated kraft or sulphite papers were of little or no value, and waxing or coating did little to improve them. Vegetable parchment and "greaseproof" papers were better and the grades known as lard liners had scores of 3 to 7. Glassines had 5 to 10 times greater resistance than vegetable parchment or greaseproof papers. Polyethylene films were better than glassine, but less grease resistant than cellulose plastic films, Pliofilm, vinylite or Saran.

Aging materials at 140 deg. F. usually reduced their resistance, but shortening papers and glassine were often improved by the aging process. Creasing unwaxed and unaged samples usually decreased grease resistance. Glassine was especially affected by creasing, but cellulose films or thermopolastic materials were not.

Digest from "Packaging. V. — The Grease Resistance of Some Common Packaging Materials," by C. G. Lavers, *Canadian Journal of Research*, vol. 25, Sec. F. 1-7, Jan. 1947.

SUGARS

Starch Conversion Sirup

AN ACID converted sirup of medium dextrose equivalent, when subjected to dialysis against water through a semi-permeable membrane, will produce a sirup of relatively high dextrose equivalent, according to a recent patent. Thus a 48 D. E. corn sirup, prepared by acid conversion, may be dialyzed against water in a continuous counter-current dialyzer with a cellophane membrane to yield a dialyzate of 63 D. E. The undialyzed sirup residue of 35 D. E. can be recycled to the acid converter to be reprocessed in the dialyzer.

Digest from U. S. Patent 2,410,264, issued October 29, 1946, on an application dated January 28, 1944, to Frank H. Brock and Clifford E. Smith, and assigned to A. E. Staley Manufacturing Co., Decatur, Ill.

Making Sugar Sirup

PRODUCTION of high-viscosity sugar sirup that is stable against crystallization, and a method of preparing dextran as the stabilizing addition agent, are revealed in recent patent specifications. Dextran gum is produced from sucrose by the bacteriological action of *Leuconostoc mesenteroides* which has been acclimated to sucrose liquor up to 35 deg. Brix. Rapid production of dextran is fostered by protein-rich nutrients such as steepwater and water extract of barley malt sprouts. It is also advantageous to maintain the pH of the liquor between 8.0 and 5.0 by the addition of calcium carbonate. The final dextran is heated to 190 deg. F. to inactivate the organism, after which it is blended with sucrose solids to produce high viscosity sirup.

Digest from U. S. Patent 2,409,816, issued October 22, 1946, on an application dated July 2, 1945, to Daniel V. Wadsworth and Mary F. Hughes, and assigned to Refined Syrups and Sugars, Inc., Yonkers, N. Y.

VITAMINS

Vitamin A Antioxidants

THE effect of pure α-, β-, and γ-tocopherols, alone and in combination with vegetable oil lecithin, on vitamin A destruction and peroxidation in soup-fin shark and halibut liver oils has been studied. Hitherto it had been thought that in order to prevent loss of vitamin A, it was necessary to inhibit peroxidation almost completely. The present investigation shows, however, that when any one of the three tocopherols is added to the fish oils in relatively high percentages (0.25 percent and up), high peroxide

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- FREEZING
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- DEHYDRATING
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values can be tolerated with only minor losses of vitamin A. At the same concentration the tocopherols, either alone or with lecithin, are not effective in inhibiting peroxidation. Lecithin alone at one percent concentration showed little or no effect on inhibiting vitamin A destruction, although its presence enhanced the effectiveness of tocopherols.

Digest from "Tocopherols as Antioxidants for Vitamin A in Fish Liver Oils," by L. O. Buxton, *Industrial and Engineering Chemistry*, vol. 39, No. 2, 225-232, February, 1947.

ENGINEERING

Quick-Freezing Device

APPARATUS for quick-freezing of food is illustrated and described in recent patent specifications. It comprises a housing containing a series of horizontal refrigerating plates, half of which are fixed and half movable vertically, one of the latter being disposed above each of the former. The movable plates are operated together by a lifting jack and hand lever located outside the top of the housing. Food to be quick-frozen is packed in containers and placed on the fixed refrigerating plates. When the jack is released the movable plates are forced down on the top of the containers by means of springs. When the food is frozen the movable plates are lifted, and the containers are removed. Refrigerant inlets and outlets from each plate are suitably connected with the refrigerating plant in the base of the housing.

Digest from U. S. Patent 2,408,154, issued September 24, 1946, on an application dated February 21, 1945, to A. J. Stone, New York, N. Y.

Concentration by Flotation

FLOTATION has been applied to the concentration of oil and proteins found in seeds of milkweed and in species of mustard, and could be applied to other materials, such as oil seed or grain screenings of relatively low oil content.

Seeds of milkweed, and mustard screenings, containing 22.3 and 21.8 percent oil respectively, were boiled in 10 volumes of water for one hr., separated from the aqueous liquor and pebble-milled for 15 hr. with 15 parts by weight of tap water. The resulting pulp was subjected to flotation in a Fagergreen laboratory flotation unit over a range of pulp densities and pH values obtained by sulphuric acid additions.

(*Continued on page* 184)

my children of food they need?"

This is a question many mothers ask themselves as they buy food today.

These mothers know far more about nutrition than did the mothers of even 25 years ago.

Magazines and newspapers have, over a long period, devoted considerable space to the important subject of "better nutrition".

Purchasers at the nation's food stores have learned what to look for in food. They know that the word "fortified" on a food package means extra nutritive values, extra nourishment.

Many manufacturers of baby foods, cereals, candies and other food products have already fortified their products.

If you are considering fortifying one or more of your food products, remember this: If there are no definitions and standards for enrichment of the products you make, you may fortify without hesitation.

Standard Brands' experience in the food fortification field—and its products for vitamin B-complex, vitamin D and protein supplementation of foods—place this company in a position to render valuable assistance to you.

We will be glad to assist any manufacturer who may need help in fortifying food products. We invite you to discuss your needs in confidence with one of our executives. Write to the address below.

Products containing

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Free MANUAL

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No flotation agent was added as the material furnished its own frothing reagents. The concentrates (froth fraction) and tailings were analyzed for oil and protein.

About 90 percent of the total oil could be concentrated in the froth fraction. The starting material contained 40-43 percent protein and the flotation concentrates 65—75 percent. Ash constituents also tended to concentrate in the froth.

Optimum conditions for separation require a pH below 7 and pulp densities between 2 and 5 percent. There is some difference in quality of oil and protein in concentrates and tailing fractions, indicating some fractionation as well as separation.

Digest from "Oil Concentration by the Froth Flotation of Pebble-Milled Seed," by N. H. Graer and J. B. Palmer, *Canadian Journal of Research*, 24, 338-47, September, 1946.

Hamburger Patty Maker

SUPPLEMENTING previous inventions, further improvement is claimed in a recent patent on the efficient production of ground meat patties. The machine consists essentially of a hopper containing ground meat which is forced downward into a mold by a vane on a rotating cylinder mounted within the hopper. As the machine operates, the completed patty is automatically ejected. The patties are of uniform size and weight and are formed without excess pressure that might extract meat juices.

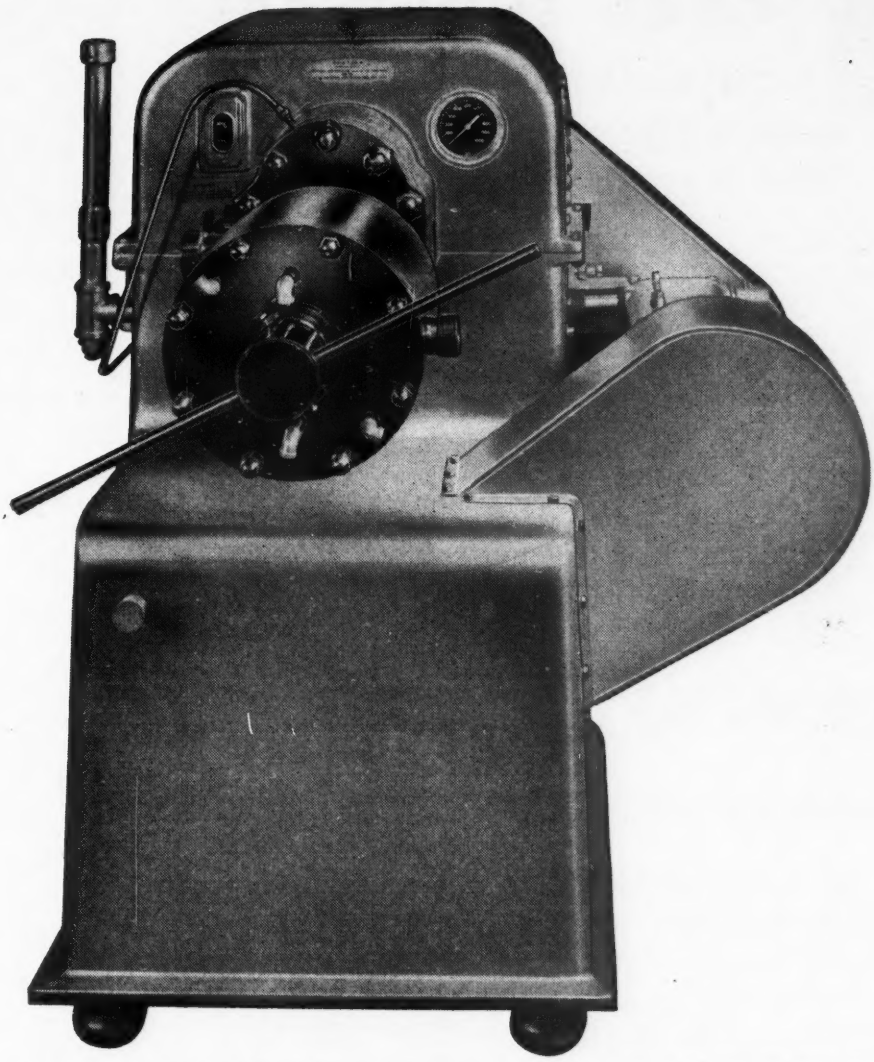
Digest from U. S. Patent 2,413,046, issued December 24, 1946, on an application dated May 1, 1944, to Harry H. Holly, and assigned to Holly Molding Devices, Chicago, Ill.

DAIRY

Dried Milk

AN investigation was undertaken to compare the effect of packing in air, carbon dioxide, nitrogen, mixtures of carbon dioxide and nitrogen, and under vacuum, on milk powders of different fat levels from different sources. Powders from one source contained 1, 26, and 28 percent butterfat; from another 1, 26, 28, and 30 percent butterfat. In gas packing the containers were twice evacuated and flooded with the desired gas before sealing. In vacuum packing the containers were held at 1 mm. pressure for 15 min. and sealed at that pressure. These samples and control samples with air in the head space were stored at 80 deg. F. and examined for palatability after 0, 1, 3, 6, 9, and 12 months. Packing in inert gas or

From The Home of New Processes for American Industry



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Types "SA" and "SAR" Oil Burners are ideal for installation as supplementary fuel systems. *Type* "SA" is adaptable to all forms of industrial heating, power or process furnaces; completely atomizes and thoroughly burns the lowest and cheapest grades of fuel oil, tar, and waste oils; requires only low oil pressure and temperature, and the internal atomizing feature uses steam for atomization. *Type* "SAR" (where steam or gas is available for atomization) safely and efficiently burns residuums obtained from process.

We have been *specialists* in the burning of liquid and gaseous fuels for 35 years. Your inquiries, accompanied by full plant data are invited . . . write now for Bulletin No. 21.

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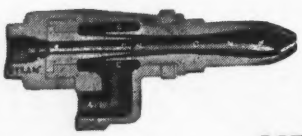

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For large capacity equipment it is most compact. For example, one model furnishes 92 G. P. M. of water cooled from 45° F. to 35° F., with 28° F. refrigerant, in less than 30 sq. ft. of floor space. Other models . . . 24 to 465 G. P. M.

Extra advantages positive temperature control; assurance of holding temperature accurately in spite of variation in cooling load; rapid chilling of liquid; savings in power and refrigeration.

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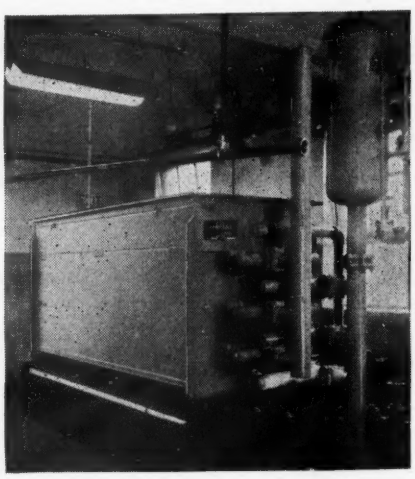

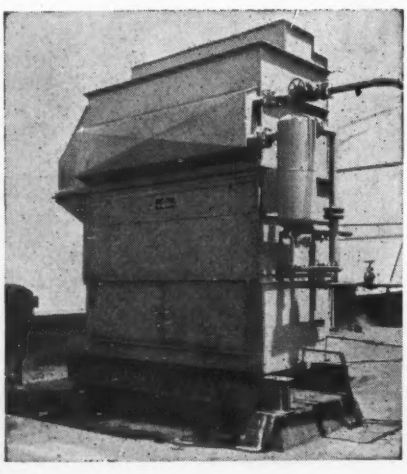

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under vacuum effected a general improvement in the quality of skim-milk powders. The storage life of whole-milk powders was increased from a maximum of 3 months when packed in air to 9 months when packed in inert gases or under vacuum.

Digest from "Dried Milk Powder: VI, The Effect of Gas- and Vacuum-Packing on Keeping Quality," by J. E. Pearce and W. A. Bryce, *Canadian Journal of Research*, F, 24, 445-449, November, 1946.

Alcohol from Whey

TORULA CREMORIS, when added to whey in an amount equal to 2 percent of the lactose initially present, will convert 85 to 90 percent of the lactose to ethyl alcohol. Steam cost of finished 95 percent alcohol is somewhat higher than for processes using grain or molasses mash, but this may be offset by the addition of glucose sirup or molasses to the whey.

As the result of experiments conducted at the Division of Dairy Research Laboratories, Bureau of Dairy Industry, U.S.D.A., *Torula cremoris* was selected from a large collection of lactose-fermenting yeasts as the most efficient organism for fermenting lactose in whey. Temperatures between 61 and 62 deg. F. and pH readings of the whey mash between 4.7 and 5.0 were found most satisfactory. Equipment and operation of a plant for producing alcohol from whey are described.

Digest from "Ethyl Alcohol from Whey," by M. Rogosa, H. A. Browne and E. O. Whittier, *Journal of Dairy Science*, 263-269, vol. 30, No. 4, April 1947.

CANNING

Processing Chicken

CHICKEN canned as solid or "jellied pack" will have different percentages of meat, depending on whether open or pressure-cooking methods are used in processing it. Pressure cooking removes a greater amount of the original moisture than does open cooking. Time of cook—50 to 100 min. open, and 20 to 40 min. at 15 lb. steam pressure—makes little difference, except for the 50-min. open cook where the moisture loss is much smaller.

Subsequent operations, in which the meat is removed from the bones, packed into cans and processed, showed greater losses for open cooked meat than for pressure cooked. To obtain the 50 to 55 percent solid meat, required for jellied chicken under Canadian law, 4-oz. of open cooked or 3.6-oz. of pres-

Shellmar Packages of

*Pliofilm

Pliofilm is one of the most versatile materials with which Shellmar works. Shellmar engineers have developed many unique applications of this material for use in protecting and marketing foods. Its moisture-vapor proof qualities work equally well in keeping moisture out of popcorn . . . keeping moisture in spinach, beet greens and ready-to-eat vegetable salad. It protects frozen poultry against freezer-burn, dehydration and scarring. As a wrap for cheese, it not only makes an attractive, marketable package but aids in the ageing process. It makes a liquid tight pouch for packaging olives in juice. If you have an unusual food packaging problem, a Shellmar Pliofilm package may be the answer. Why not investigate—*now*?

**Pliofilm is a trade-marked product of the Goodyear Tire and Rubber Co.*

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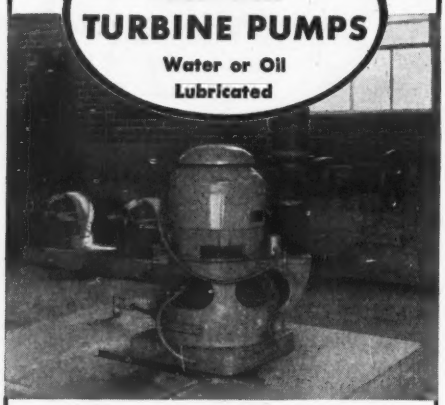

Capacities: up to 30,000 g.p.m. Lifts: up to 1000 ft. Pump is lubricated by well's own water. Adaptable to all forms of drive. Installation shown is in a mid-western ice plant. Ask for Bulletin B-141-1.

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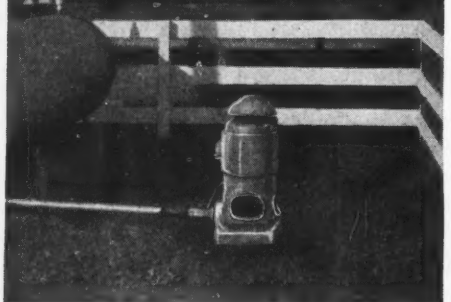
For deep or shallow wells



Capacities: from 600 to 3300 gals. per hour. For installation in wells 4" inside diameter and larger. Chrome rotor revolving in rubber stator literally "squeezes" water upward. Fully patented. Ask for Bulletin B-142.

PEERLESS PUMP DIVISION
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sure cooked meat must be used to obtain 3.5 oz. of meat in the final product.

During cooking dark meat loses more moisture than white meat and the older fowls lose more weight than the younger ones.

Digest from "The Effect of Method of Cooking on the Moisture Content of Canned Pre-Cooked Poultry Meat," by D. MacDougall and N. E. Gibbons, *Canadian Journal of Research*, vol. 25, Sec. F, 22-28, Jan. 1947.

QUALITY CONTROL

Butter Quality

MEASUREMENT of fluorescence is suggested as an objective method of determining quality of butter and demonstrating changes in the product under storage conditions. Preliminary investigations showed that the fluorescence values of serum from salted butter were affected by separation temperature, dilution, nature and pH of the diluent, and stability of the diluted serum. From these trials the following satisfactory procedure was developed: Serum is separated by placing 125 g. of butter in centrifuge bottles and heating to 113 deg. F. in a boiling water bath. The fat is siphoned off after centrifuging at 1700 rpm. Two ml. of serum are then diluted to 50 ml. with 10 percent sodium acetate. The pH is adjusted to 5-6 and the fluorescence determined immediately in a Coleman photofluorometer using a filter that transmits light in the region of mμ. This procedure gave fluorescence values that were correlated with flavor score on butter stored at 90 deg. F.

Digest from "A Fluorescence Method for Assessing the Keeping Quality of Butter," by G. A. Grant and W. H. White, *Canadian Journal of Research*, F, 24, 461-466, November, 1946.

Tocopherol Separation

TOCOPHEROLS have been successfully separated from oils for analytical purposes by molecular distillation. At levels such as those in animal fats—60 micrograms per gram—only 60 to 70 percent of the tocopherol is recovered by saponification. By molecular distillation recovery is complete.

A one g. sample in an aluminum cup is placed in a glass cylinder immersed in an oil bath at 419—428 deg. F. A "cold finger" condenser in the cylinder contains dry ice and acetone, on which the tocopherol fraction condenses during distillation at one micron pressure. After 30 min. the oil bath is removed and when the apparatus cools the con-

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CASE HISTORY No. 11 . . . . LIMESTONE
51% saving in container costs.
68% saving in labor costs.
186% gain in packaging output.

CASE HISTORY No. 12 . . SOAP POWDER
80% saving in total packaging costs.
140% gain in packaging output.

CASE HISTORY No. 13 . . . SOYA FLOUR
Increased sanitary protection of flour.
Sizable savings in packaging costs.

CASE HISTORY No. 14 . . . . CHEMICALS
Reduced container costs.
50-70% reduction in packaging costs.

CASE HISTORY No. 15 . . . . . ALCOHOL
75% saving in container costs.
50% saving in labor costs.
50% saving in storage space.

St. Regis Packaging Systems are designed to meet a wide range of product requirements and plant layouts. Packers are available in a variety of sizes and types, with filling speeds as high as twenty-four 100-lb. bags per minute—with one operator. Nearly 400 commodities—rock products, fertilizers, chemicals, foods, and feeds—are now being packaged in sturdy, low-cost multiwall paper bags.

FIVE MANUFACTURERS PACK...

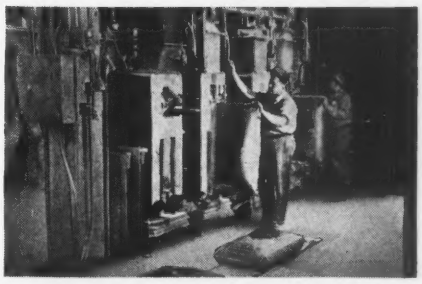
Limestone — Soap Powder — Soya Powder Chemicals — Alcohol ... CHEAPER AND BETTER

Factual Case Histories Show How Producers Save with St. Regis Packaging Systems.

If you pack a granular, pulverized, or powdered product, you can save money and increase packaging efficiency by installing a St. Regis Packaging System. These case histories reported to us by manufacturers of five different products are typical of the results gained with St. Regis Systems — consisting of valve bag filling machines and multiwall paper valve bags. Savings total as much as 80% compared with previous methods, with many other advantages as well.

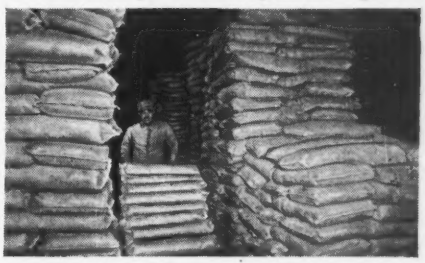
St. Regis Packers and multiwall bags cut labor costs and container costs, help eliminate dust, and also increase hourly packaging output. Customers welcome the clean, compact protective multiwall bags wherever they are used—whether for rock products, fertilizers, feeds, foods, or chemicals.

Write today for free copies of any or all of these detailed case histories. A St. Regis packaging engineer will be glad to discuss your specific packaging problems with you. For further information, call or write the nearest St. Regis office.

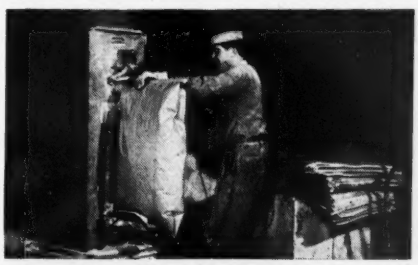


Case History No. 13—Soya Flour: Floor level conveyor handles packer output.

Case History No. 11—Limestone: 4-tube packer permits uninterrupted operation.



Case History No. 14—Chemicals: Multiwalls stack well in storage areas.



Case History No. 12—Soap Powder: One man operates 100-LS packer.

Case History No. 15—Alcohol: Multiwalls save 50% storage space.

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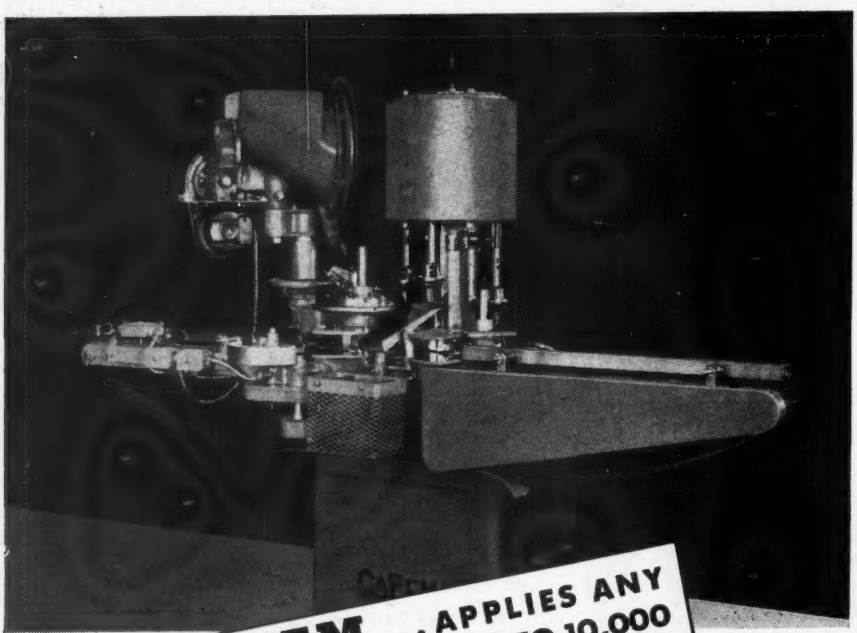

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denser is removed and the tocopherol washed off with chloroform. After transferring to absolute alcohol, analyses for total and gamma tocopherols are made.

Food fats assayed by this method gave the following values for total and gamma tocopherols; margarine 544 and 260; lard 27, and less than 4; carrot oil 1,620 and 0; cottonseed oil 726-901 and 343-345; egg lipide (from whole egg, 11.5 percent lipide) 130 and 44; olive oil 69 total; all in micrograms per gram.

Digest from "Molecular Distillation as a Step in the Chemical Determination of Total and Gamma Tocopherols," by M. L. Quaife and P. L. Harris, *Industrial and Engineering Chemistry*, Analytical Edition, vol. 18, no. 11, 707-8, November, 1946.

MISCELLANEOUS

Making Salt Brine

CONTINUOUS production of brine from rock salt, containing only a trace of impurities originally present in the salt, is described in a recent patent. The apparatus consists of three inverted concentric cones suitably spaced from each other and open at the top. The outer and inner cones have valved outlets at their lower points. The middle cone is supported between them, forming two annular conical spaces, one acting as a filter and the other as a reservoir of clean brine which is drawn off near the top of the cone. Salt flows into the conical unit from a storage hopper, completely filling the inner cone and the space between the inner and middle cones. Water is introduced near the bottom of the inner cone, rises through the mass of salt, passes downward through salt in the inner annular space, and upward through the outer annular space to a point of discharge. The product is a substantially pure salt brine. Impurities tend to settle out from the dissolving mass and may be flushed away.

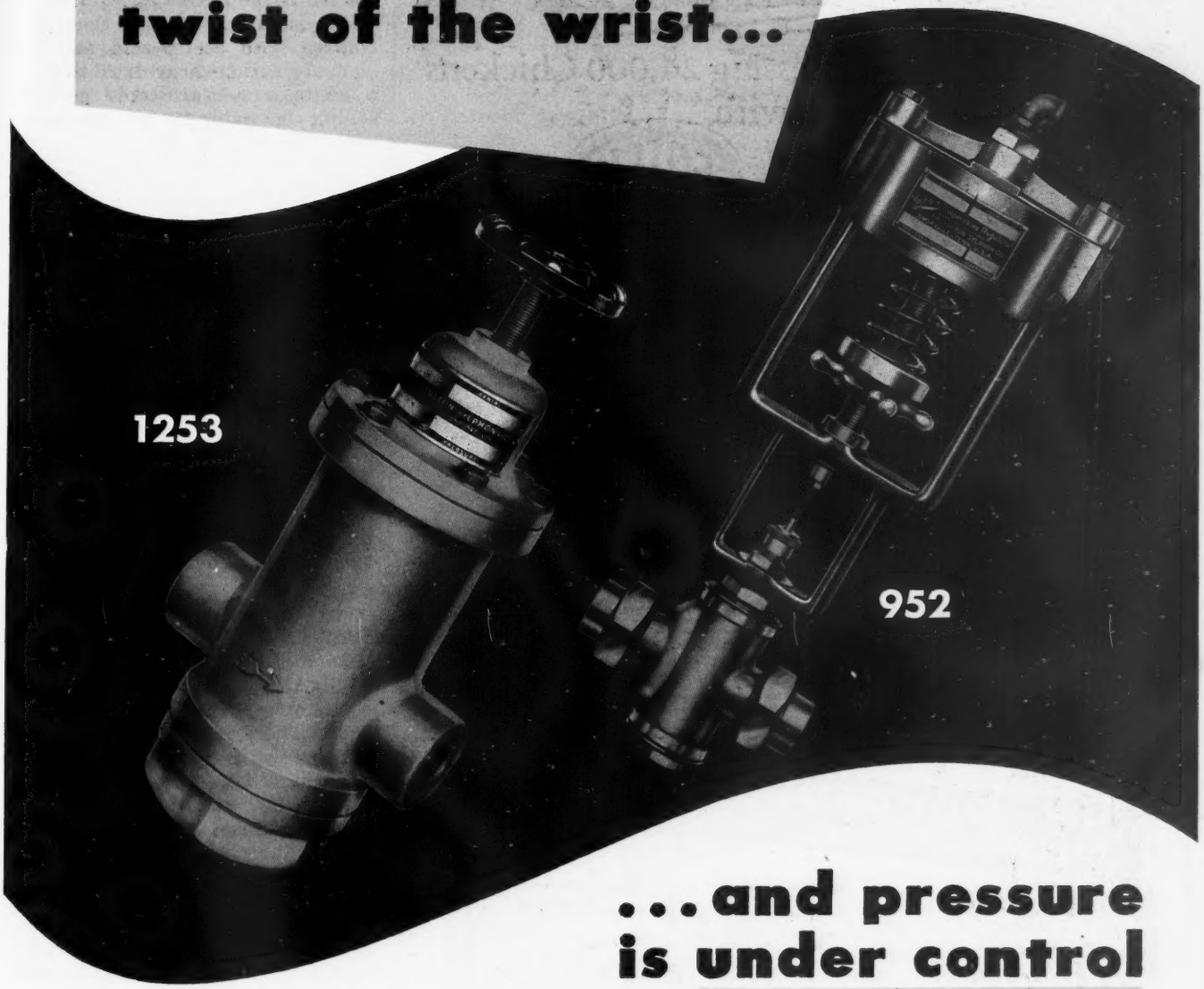
Digest from U. S. Patent 2,412,560, issued December 17, 1946, on an application dated May 4, 1943, to Frank L. Bolton, Ithaca, N. Y.

Synthetic Eggwhite

MANUFACTURE of synthetic protein from fresh or dried codfish or steam-dried shrimp was begun in Germany in 1934 and continued until the plant was partly destroyed during the war. The product is a substitute for egg white for both food and technical uses. It is reputed to have superior whipping qualities, but retains a slight taste of fish.

The process consists essentially

A simple twist of the wrist...



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On the left is the No. 1253 with packless, all-metal construction. Single-seated valve for dead-end service—may be held in wide open position. Requires no "feeler" pipe. Reduced pressure ranges—20 to 100 lbs. and 30 to 150 lbs.

Shown with it is the No. 952 which is used as an automatic pressure regulator for reducing from high to low pressure—or to insure a constant delivery pressure when supply fluctuates. Equipped with direct-acting type valve (closes with rising pressure). Maximum initial pressure—150 lbs.; maximum controlled pressure—100 lbs.

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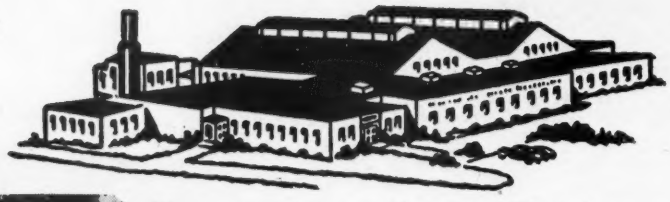
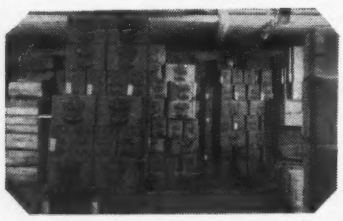
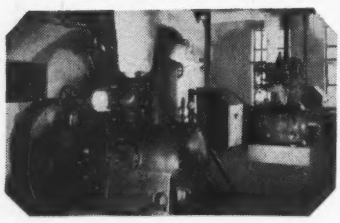


Part of the Poultry Processing Line



Frozen Chickens in –5° Storage



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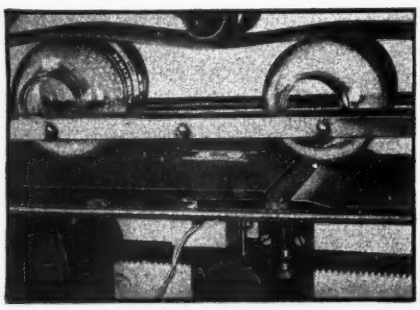

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in successively removing from the fish tissue the readily soluble proteins (with dilute acetic acid) and the lipids (with trichlorethylene, or preferably alcohol). The extracted tissue is treated with warm dilute sodium hydroxide, then neutralized with acetic acid and the neutral solution spray-dried to yield a white, non-hygroscopic powder, soluble in water to an opalescent somewhat viscous solution.

The percentage yield of protein from the three raw materials was: fresh codfish, 14; dried codfish, 50; dried shrimp, 75. One analysis of the powder showed that it contained 93.9 percent protein, 4.65 percent water, less than one percent of salt, calcium oxide, ash, phosphoric acids, organically bound iodine, and a trace of fat. Analysis of the constituent amino acids showed excellent food values, the only notable deficiency being methione.

Digest from "Synthetic Eggwhite from Codfish and Shrimp, Deutsche Eiweiss G.m.b.H.," by A. K. Balls, Joint Intelligence Objectives Agency, Washington, D. C. Fiat Final Report No. 520, November 28, 1945.

Coffee Extract

DESIGNED to minimize loss of easily volatilized flavor and aroma, a process has been patented for making coffee extract in either dry or sirup form. The principal feature of the process is the recovery of at least a part of the extractives at a low temperature and the concentration of this portion by freezing.

Ground coffee is soaked in cold water for about one hr. and then centrifuged. The extract is subjected to successive freezing and centrifuging until it has a density of 15 to 20 deg. Bé. The grounds are then transferred to a cooking vessel and boiled in water for about five min. The mixture is centrifuged, the extract clarified and evaporated at a vacuum of 28 in. Hg. to a density of 30 to 32 Bé. At this point hydrogenated vegetable oil such as coffee oil is added, and the extract is combined with the cold extract. The mixture may be further concentrated to a thick sirup or dried to a powder.

The coffee grounds from the hot extract are further treated in a counter-current extraction system, the liquor of which is returned to the hot extractor. A small quantity of taka-diastase is added to the last extractor in the counter-current system, the spent grounds of which are discarded.

Digest from U. S. Patent 2,408,260, issued September 24, 1946, on an application dated September 21, 1942, to J. L. Kellogg, assignor to John L. Kellogg & Co., Chicago, Ill.

BOOKS

Food Revolution

TOMORROW'S FOOD. By James Rorty and N. Philip Norman. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y., 1947. 258 pages; 5½x8¼ in.; cloth. Price, $3.50.

Those who consider food processing as being among the sacred professions had better leave this book alone. With more enthusiasm than is warranted, they tell of the coming "revolution" in nutrition, in which all the devitalization of our present preserved food supply will have been corrected.

No food plant operator will quarrel with the goal. And most will agree that some harm has been done during the short history and sharp growth of food processing. But to compare the vigor, bone structure and particularly the teeth of primitive tribes with those of our urban "cliff dwellers" and to blame it all on nutrition is carrying the ball far beyond the goal posts.

Tomorrow's food will be improved because the food processor is following close upon the heels of sound nutrition research. It is well not to forget that our urban population had to be fed during the years that research was discovering that their food supply was not perfect. And the food had to be supplied and distributed at a price and in a manner that would reach all the people.

Tomorrow's food will not result from any revolution in nutrition. It will be the outcome of the natural growth and development that food processing has followed since pre-Civil War days. Until recently this development has had to advance at a far more rapid pace than nutrition research could attain. And now that nutrition is catching up we may expect notable improvement.

It is an interesting book, nevertheless.

Sound Wages

BASIC CRITERIA USED IN WAGE NEGOTIATIONS. By Sumner H. Slichter. Published by The Chicago Association of Commerce and Industry, 1 No. LaSalle St., Chicago, Ill., 1947. 56 pages; 5½x8½ in.; paper. Price, 50 cents.

Probably no single phase of industrial operations will hold so important a place, during 1947, as wage negotiations. The food industry, holding the center of the stage in the drive to reduce prices, is particularly sensitive to the dangers of an unbalanced wage pattern, both from within the industry and outside of it.

This pamphlet, prepared by the Lamont professor of economics at Harvard, was written in response to a request by the publishers for an analysis of the whole wage structure. It considers all the economic aspects of wages, as they relate to the individual, to industry and to the overall economy. Its comparatively few pages cover the related considerations of family budgets, cost of living, take-home pay, productivity, ability to pay, consumer buying power, wage comparisons in different localities, and the relations between wages, prices, employment and production.

These considerations are all based on historical data and bring together, in a single publication, the criteria generally used in wage negotiations along with a comprehensive discussion of their implications.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the Bureau responsible for its issue.

FEDERAL LEGISLATION, RULINGS, AND REGULATIONS AFFECTING THE STATE AGRICULTURAL EXPERIMENT STATIONS. Revised Sept. 1946. Department of Agriculture, Miscellaneous Publication No. 515. Price 15 cents.

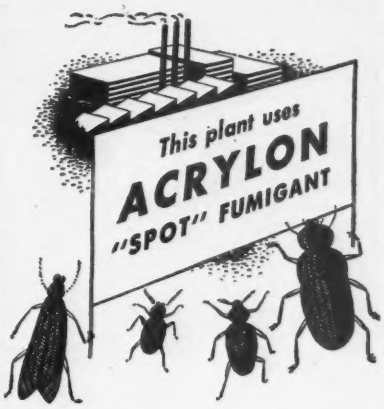
SILVERFISH. By E. A. Back. Department of Agriculture Leaflet No. 149. Price 5 cents.

A PHOTOELECTRIC REFRACTOMETER. By Enoch Karrer and Rollin S. Orr. Bureau of Agricultural and Industrial Chemistry, AIC-126. Mimeographed.

NUTRITIVE VALUE OF THE PER CAPITA FOOD SUPPLY, 1909-45. Department of Agriculture, Miscellaneous Publication M616. Price 20 cents.

AGRICULTURAL PROCESSING INDUSTRIES. Columbia Basin Joint Investigations, Problem 24. Bureau of Reclamation. Price 30 cents.

KEEP OUT ALL INSECTS!



Infestation of machines in bakeries, flour mills, and similar food-processing plants has always been a serious and difficult problem.

ACRYLON,* the potent new "spot" fumigant, now provides a quick and effective answer. A few ounces poured in a machine rid it of insects with relatively short exposure. ACRYLON vaporizes completely, leaving no residue. It presents no fire hazard, and does not adversely affect food products in any way.

ACRYLON is economical. Fluid-ounce graduations on the quart-size bottle assure accurate measuring, no waste. Also available in 10-gallon and 50-gallon drums. *Reg. U. S. Pat. Off.

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PATENTS

Aging and Maturing of Table Wines Accelerated by Use of Wood Chips or Shavings on Which Cryptogamic Growth Has Been Activated by Vegetable Hormones—Ernst T. Krebs, San Francisco, Calif. No. 2,415,431. Feb. 11, 1947.

Overdrying of Food Products in Continuous Drying System Prevented by Introduction of Moistened Material at Terminal End of System—Robert M. Schaffner, Chicago, Ill., to Guardite Corp. No. 2,415,445. Feb. 11, 1947.

Liquid Foods Desiccated When Atomized in Upper Portion of Drying Chamber into Which Hot Drying Gas Is Introduced—David D. Peebles, Hillsborough, Calif., to Golden State Co., Ltd., San Francisco, Calif. No. 2,415,527. Feb. 11, 1947.

Powdered Milk and Like Filled into Cartons and Other Containers by Mechanical Means—David D. Peebles, Hillsborough, and Guy P. Hensley, San Francisco, Calif., to Golden State Co., Ltd., San Francisco, Calif. No. 2,415,528. Feb. 11, 1947.

Starchy Materials Converted to Fermentable Sugars by Acidifying Water Suspension and Alternately Premalting with Malt Solids and Cooking Several Times at Different Temperatures—Robert G. Dworschack, Milwaukee, Wis., and Everette M. Burdick, Peoria, Ill., to the United States of America. No. 2,415,734. Feb. 11, 1947.

Beer and Other Alcoholic Malt Beverages Freed from Insoluble Proteins by Treatment with Colloidal Dispersion of Magnesium Silicate in Water and Subsequently by Aqueous Bisulphite Solution—Hans Joachim to Inerto Co., San Francisco, Calif. No. 2,416,007. Feb. 18, 1947.

String Beans Graded by Two Concentric Rotating Drums Consisting of One Outer Set of Spaced Rings and One Inner Set of Spaced Rings Lying in Planes Alternately Interspersed with Rings of Outer Drum—Charles E. Keer, Hoopeston, Ill., to Food Machinery Corp., San Jose, Calif. No. 2,416,008. Feb. 18, 1947.

Meat Precooked at 160 to 200 Deg. F. at Atmospheric Pressure for 20 to 30 Min. Without Addition of Water Preliminary to Addition of Curing Agent and Subsequent Cooking to Produce Corned Meat—Harry H. McKee to Industrial Patents Corp., Chicago, Ill. No. 2,416,190. Feb. 18, 1947.

Doughnuts Formed in Manually Operated Unit of Low Production Capacity—Willard R. Cottingham, Minneapolis, Minn. No. 2,416,470. Feb. 25, 1947.

Liquid Concentrate Made from Hot Water Infusion of Ground Coffee by Freezing Preliminary to Heating to Maintain Temperatures Always Below Freezing Point of Water Until Crystals Form and Liquid Separates—Harry A. Noyes, Watertown, Mass. No. 2,416,945. March 4, 1947.

Fruits, Potatoes and Like Peeled by Action of Series of Rotating Rings Mounted on Horizontal Axis and Interconnected by Means of Rods—Josef Meyer, Dietikon, Switzerland. No. 2,416,837. March 4, 1947.

Fruit Split and Pitted by Mechanical Means—Donald E. Prenveille, Oakland, Calif. No. 2,417,174. March 11, 1947.

Fat-Soluble Vitamin Made Water-Soluble in All Proportions by Treatment with Solubilizing Agent to Give Stable Clear Solution—Louis Freedman, Mount Vernon, and Edward Green, New York N. Y., to U. S. Vitamin Corp. No. 2,417,299. March 11, 1947.

Aging of Wines and Other Alcoholic Beverages Speeded Up by Use of Wood Impregnated with Vegetable Hormones—Ernst T. Krebs, San Francisco, Calif. No. 2,417,505. March 18, 1947.

Hulled Sunflower Seed Heat-Treated at 80 to 120 Deg. C. Preparatory to Flaking—Ezra Levin, Champaign, Ill. No. 2,417,507. March 18, 1947.

Starch, Gelatin and Gum Colloids Prevented from Congealing by Use of Inhibitor Precipitated from Water Solution Containing Phenol, Sodium Acetate and Hexamethylenetetramine as Essential Ingredients—Henry T. Neumann, New York, N. Y. No. 2,417,515. March 18, 1947.

Fruits and Vegetables Finely Ground When Fed Under Pressure Against Cutting Disk Rotating About Horizontal Axis—Joseph MacRae Newman, Weston, Ontario, Canada. No. 2,417,564. March 18, 1947.

Starch Made Insoluble and Non-Gelatinizing in Boiling Water and Alkaline Solutions by Treatment with Formaldehyde and Acid to Give pH of 2.5—4 and Heating Above 140 Deg. F. to Dry—Gordon G. Pierson to Perkins Glue Co., Lansdale, Pa. No. 2,417,611. March 18, 1947.

Pastry Glazed by Mechanical Means—Peary F. Ratcliff, Shreveport, La. No. 2,417,614. March 18, 1947.

Potatoes Blanched at About 229 Deg. F. for About 2 Min. Preliminary to Drying in Atmosphere of Super-heated Steam While Exposed to Intense Radiant Heat—Robert M. Schaffner, Chicago, Ill., to Guardite Corp. No. 2,417,843. March 25, 1947.

Preservation of Food Improved by Storing in Enclosed Space in Which Dilute Solution of Acetic Acid Vaporizes from Porous Absorbent Mass—Mortimer J. Stammelman, New York, N. Y. No. 2,417,889. March 25, 1947.

BASIC FLAVOR MATERIALS

FOR FOOD PRODUCTS MANUFACTURE

Solid Extracts

ST. JOHNS BREAD
SWEET ORANGE PEEL
LICORICE
FOENUGREEK
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ESSENTIAL OILS • AROMATIC CHEMICALS • SPICES
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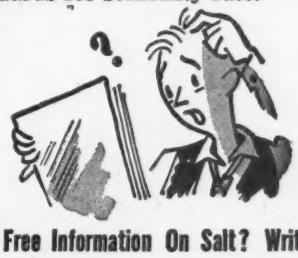
TELL US MORE
Teacher!

● Maybe you're like a lot of food technologists and salt buyers who have gone along thinking all salt is the same. Actually, of course, various brands and grades and grains of salt differ in many respects.

Take solubility: In salting cheese, slow solubility is highly important and desirable. Otherwise, salt is lost in the whey, producing flat, under-salted cheese. On the other hand, in salting butter, salt must dissolve with lightning speed. If the butterfat is on the soft side—lacking in body—at certain seasons, butter salt must dissolve so quickly that over-working is avoided. Otherwise, the butter may lose its desirable physical properties and become mottled or marbled—and may lose its moisture, become leaky. Yet, if the salt is not properly dissolved, the butter may be gritty.

To meet these problems, we have set up definite solubility standards for Diamond Crystal Salt. Our Butter Salt, for example, dissolves completely in water at 65° F. in less than 9.8 seconds—average rate, 9.2 seconds. That is why so many quality-minded food processors have learned to depend on Diamond Crystal products, manufactured under strict quality-control standards for solubility rate.

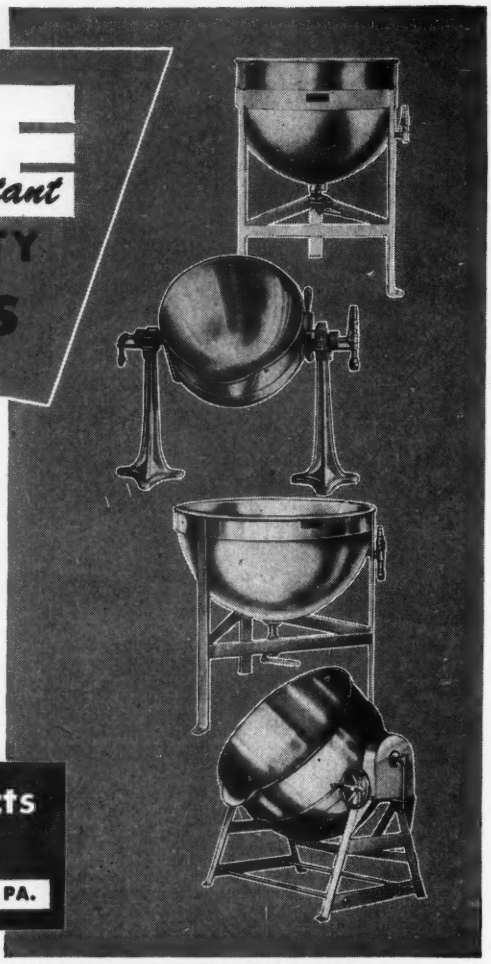


Want Free Information On Salt? Write Us!

If salt solubility enters into your processing, write to our Technical Director. He will gladly recommend the correct Diamond Crystal Salt for best results. Diamond Crystal, Dept. J-12, St. Clair, Michigan.

DIAMOND CRYSTAL
ALBERGER PROCESS SALT

LEE
Corrosion-Resistant
HEAVY DUTY
Kettles



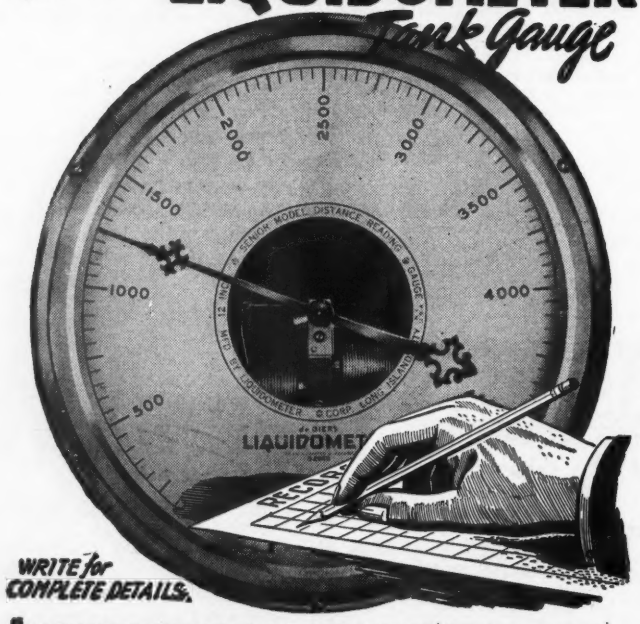
Experienced LEE engineers and master craftsmen, with complete modern shop facilities—a flexible production organization—enables LEE to build the type of industrial corrosion-resistant KETTLES you need, *in any desired size.*

All Lee Kettles are made to ASME Code and Certificates furnished with each job.

Write for Descriptive Bulletin

LEE Metal Products Company, Inc.
415 PINE ST. PHILIPSBURG, PA.

YOU'RE ALWAYS SURE
With A LIQUIDOMETER
Tank Gauge



WRITE for COMPLETE DETAILS.

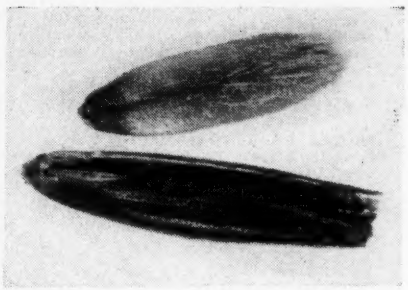
"LIQUIDS WORTH STORING ARE WORTH MEASURING"

THE LIQUIDOMETER CORP.
38-14 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

Processing Cereals

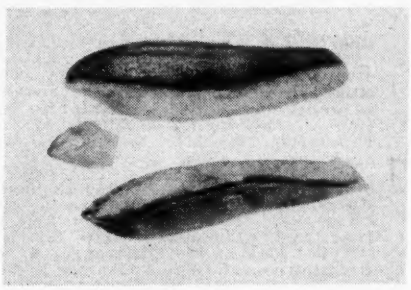
(*Continued from page* 75)

sociaters through which the grain will be cycled, with suitable segregation between each step. The end



Oat berry is separated from husk by explosive dissociation process.

product will be flour and its by-products, or, if desired, the removal of any of the component parts of the cereal grain.



Process causes splitting of oat berry and separation of germ.

Experimental Flour

Whole wheat, germ-free flour has been prepared in the experiments and has been baked into bread. Countless other tests have been made on the effects of humidity, rate of feed, time of pressurization, and pre-treatment of grain with enzymes and other substances with materially improved results. Studies are being made of the effect of temperature and the effect of active and inert gases. It is not known as yet if the process can deal with the problem of making white flour.

Magnified wheat endosperm and bran particles ready for segregation and pulverizing of endosperm into flour.

A market is as BIG *as its best newspaper makes it*

That's a fact . . . the GLOBE-DEMOCRAT covers the *entire* St. Louis *market* effectively.

Besides blanketing the City, where 2,371 Grocery Stores sell to 816,000 people, the GLOBE-DEMOCRAT gets out to the outskirts, where 2,330,000 people patronize 4,616 Food Stores.

No other daily *even claims* to take your advertising to St. Louis and 88 surrounding counties in Eastern Missouri and Southern Illinois (the 49th State) . . . with 50% family coverage in 274 busy towns.

* * *

Not only that! GLOBE-DEMOCRAT advertisers have the additional advantage of *knowing* how their products (and their competitors' products) are selling. The GLOBE-DEMOCRAT continuous Food Store Inventory keeps tab on all the movement of merchandise in the market.

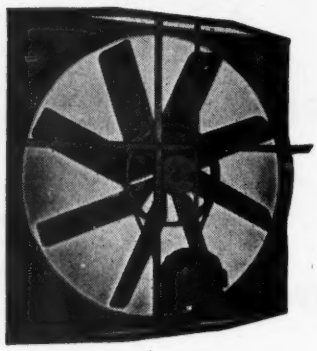
St. Louis Globe-Democrat

There's a NEW SPIRIT in the AIR

WITH

Coolair
TRADE MARK

EXHAUST FANS



FRESH AIR, moving at speeds sufficient for *cooling*, is a mighty important factor in developing maximum worker efficiency, especially in the heat of summer. Coolair BREEZE CONDITIONING is the *scientific* way of providing the benefits of healthful, cooling fresh air, and of removing every trace of dangerous fumes and odors.

COOLAIR EXHAUST FANS are *precision*-built, and every Breeze Conditioning installation is made in accordance with *precise* formulas for air movement developed by the American Coolair Corporation. Coolair dealers are trained under factory supervision in the planning and installation of Breeze Conditioning equipment. *Your* Coolair dealer will be glad to give you full information or make a survey of your building, without obligation!

ENGINEERS and ARCHITECTS
For descriptive and technical data see:
SWEET'S CATALOG FILE Architectural
SWEET'S CATALOG FILE for Builders
A. S. H. V. E. GUIDE
ELECTRICAL BUYERS REFERENCE

AMERICAN COOLAIR CORPORATION
Pioneer Manufacturers of V-Belt Drive Exhaust Fans
3604 Mayflower Street **Jacksonville 2, Florida**

DETECTO SCALES

There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight discrepancies immediately visible.

DETECTO HEAVY DUTY SCALE
Another Detecto-Gram scale for many industrial uses speeds production. Hairline accuracy in a heavy scale! Special indicator eliminates overweight. Platform size, 10½"x 14". Overall height, 32". Capacity, 200 lbs. Immediate delivery. Write for full description.

DETECTO · SCALES · INC.
MAKERS OF FINE SCALES SINCE 1900
1006 MAIN STREET · BROOKLYN 1, N. Y.
SCALE ENGINEERS IN ALL PRINCIPAL CITIES

Food Packaging

(*Continued from page* 91)

continuous filling weight control by check weighing packages and indicating overfilling or underfilling. The machine automatically ejects every underweight package from the line. It can also be set to eject both overweight and underweight packages. An indicating device, known as a weight frequency indicator, warns operating personnel whenever a filling machine needs checking or adjusting.

A drift indicator shows how far the average weight of the package has shifted from the assigned average. Filling machine performance is made on a continuous chart located in the plant superintendent's office.

Triangle Packaging Machinery Co. has a new machine, called an Elec-Tri-Pak Weigher, for weighing foods, such as potato chips, wrapped candies, nuts and dry beans into bags or cartons. Outstanding feature of this machine is its automatic bag releasing mechanism.

—End—

Palletized Handling

(*Continued from page* 93)

Cost comparisons were made at several levels where 500,000 cases were held the greater part of the year and the remainder were removed rapidly. The figures in Table III show what happens to costs when one, three and six million units are handled annually by complete, partial and non-palletization. With an increase in the number of units handled, palletization shows dollar savings when compared with the hand truck system. When pallets are used for three or six loads annually instead of one, dollar savings are greater.

Handling Conditions

Economic laws governing palletized handling also govern materials handling by the use of continuous conveyors. In the latter there must be a velocity and volume to warrant the initial investment. In the former, pallets must get some repetitive use and must not be an addition to floor cost. A three-high stack of palletized goods, for instance, has a $0.70-per-square-foot investment. If it is a long-dormant stack, it can be very expensive storage. Gravity or powered continu-

Give your mixes

Extra flavor extra richness at lower cost

WITH

Soy Flour

Whether it's a pie dough mix—a muffin mix or *any* mix to be made into batter or dough, you'll find soy flour a real help.

First, without increased cost you can extend your use of scarce ingredients—and step up richness with Staley's specially processed Soy Flour.

Second, you'll be able to provide better color and flavor, to increase the desirability of your product.

Work with us and learn what soy can do for you, in lowering costs and in improving quality. See for yourself how soy flour can offer you a combination of practical advantages for mixes which cannot be found with other ingredients.

Our experience is at your command. We know soy and how to help you take the fullest advantage of its exceptional qualities. Mail this coupon—today—and let us show you what Staley's Soy Flour can do for you.

A. E. STALEY MFG. CO.

Industrial Sales Division, Decatur, Illinois

STALEY'S HI-FAT SOY FLOUR ★ STALEY'S LO-FAT SOY FLOUR

Canadian Representative:
James L. Doig, 6876 Sherbrooke Street West, Montreal 28, Quebec, Canada

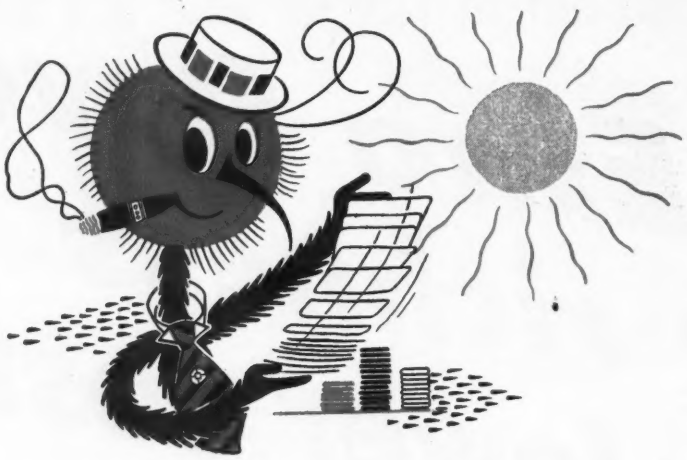
MAIL US THIS COUPON

A. E. Staley Mfg. Co., Dept. FI-6
P. O. Box 1091
Decatur, Illinois
Gentlemen:
Please give us full details on how we can make better bread and sweet dough at lower cost with Staley's Soy Flour.

Name.....

Address.....

City.....Zone.... State.....



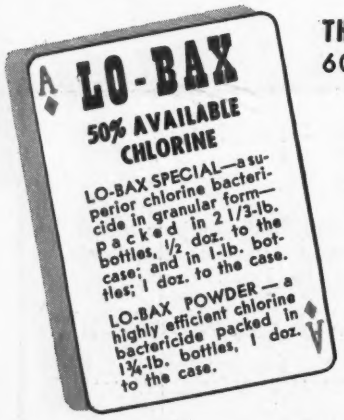
DON'T GAMBLE
WITH FAST-BREEDING BACTERIA
. . . USE LO-BAX

It's smart to use Lo-Bax wherever food products are handled—especially during warm weather when bacteria multiply so much faster.

Lo-Bax, the concentrated, fast-killing chlorine bactericide, helps prevent food spoilage and improves quality standards by rigidly controlling bacteria and sanitizing all surfaces with which food comes in contact.

Easy to handle—Lo-Bax kills bacteria almost instantly . . . at amazingly low cost. It contains 50% available chlorine, dissolves quickly in water—hot or cold, hard or soft—to make clear rinse solutions.

Order Lo-Bax from your supply house today! It's just what you need for safe, sure control of bacteria this summer.


LO-BAX
50% AVAILABLE CHLORINE
LO-BAX SPECIAL—a superior chlorine bactericide in granular form—Packed in 2 1/3-lb. bottles, 1/2 doz. to the case; and in 1-lb. bottles; 1 doz. to the case.
LO-BAX POWDER—a highly efficient chlorine bactericide packed in 1¾-lb. bottles, 1 doz. to the case.

THE MATHIESON ALKALI WORKS (Inc.)
60 E. 42nd St., New York 17, N. Y.

Mathieson
LO-BAX
CHLORINE BACTERICIDE
50% AVAILABLE CHLORINE

Lo-Bax . . . Super-Nufos . . . HTH-15 . . . Dry Ice . . . Carbonic Gas . . . Ammonia, Anhydrous & Aqua . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Liquid Chlorine . . . Chlorine Dioxide . . . PH-Plus . . . Synthetic Salt Cake . . . Sodium Chlorite Products . . . Sodium Methylate

ous flow conveyors likewise cannot be idle to earn. There may be some instances, however, where conveyors can be instrumental in effecting savings if used for a twofold purpose. Where, for instance, an operation can be performed during movement, these savings must be considered as: (1) In passing through a case sealing machine, or (2) by a proper length of gravity roller unit, performing a temporary storage between a continuous discharge at one end and an intermittent takeaway at the other. Generally, a preliminary survey of the materials handling problem will show a clearcut advantage for either use of unit load or continuous flow methods. It then becomes necessary to determine the specific methods to employ.

Conditions influencing the materials handling problem are: (1) Amount of materials; (2) type of goods; (3) number of different items and quantities of each; (4) method of receipt; (5) method of shipment; (6) size of units; (7) intra-warehouse processing, such as labelling and casing and (8) optimum size of pallets, if units are palletized. Multiple-story structures may make complete palletized handling uneconomical. A system involving the use of hand pallet trucks or even hand trucks for bulk stacks above the first floor together with forklift trucks and pallets for the first floor may work out satisfactorily. A gravity conveyor for handling outgoing material from upper floors might be incorporated in the handling system. Generally, single-floor structures, with maximum head clearance and minimum roof supports are desirable for palletized handling.

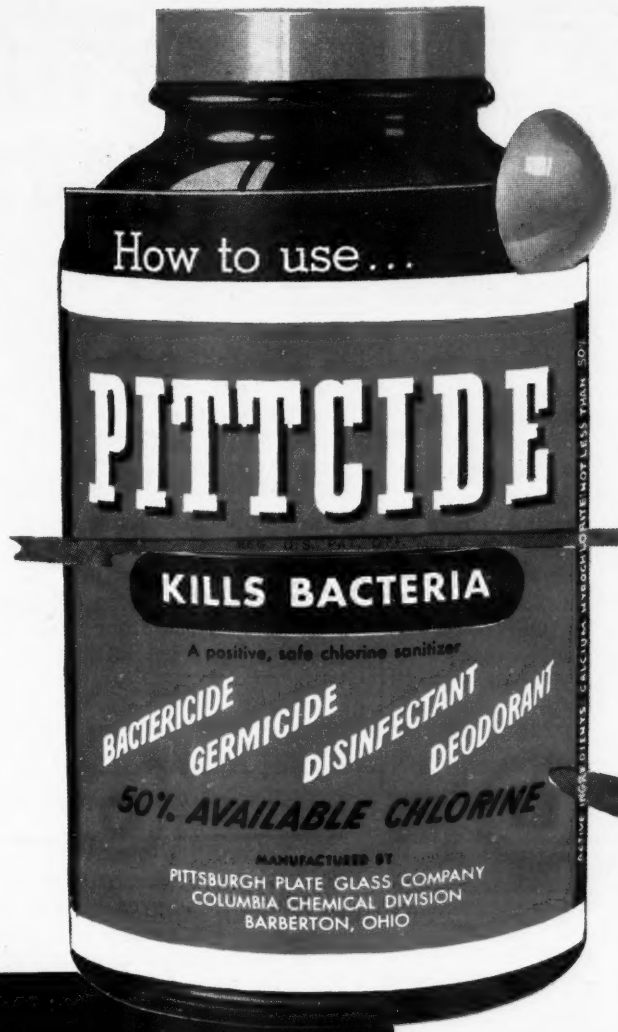
—End—

Time Studies

(*Continued from page* 112)

also be used to reduce the price of milk to the consumer, in this way improving the competitive position of milk among foodstuffs.

The time study technique is being employed by United Parcel and other store and wholesale distributors. They report higher efficiency and lowered costs among the results. These methods might be used, for example, to study the effect of the adoption of paper containers on route operations, and so, on distribution costs. A guide would thus be furnished on procedures to change delivery practices. The same



KILLS BACTERIA

√easy to use
√dust-free
√fast, sure action

IDEAL FOR USE WHEREVER FOOD IS PREPARED OR SERVED

Use Pittcide solutions for the swift, positive sterilizing protection of chlorine. Pittcide is a granular calcium hypochlorite, containing 50% available chlorine. Dry, free-flowing, dust-free. Greater density means smaller amounts of Pittcide are used for preparing solutions. Easy to handle and use—goes into solution readily in water, any required strengths.

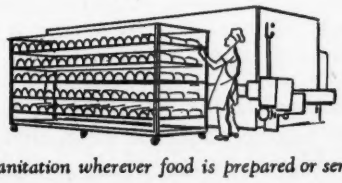
Pittcide is a product of America's largest merchant producer of chlorine. Order from leading supply houses in the red-capped, free-pouring 1¾ lb. bottles, 12 per case. Write for literature and the name of your nearest supplier.

Dealers are invited to write regarding the sale of Pittcide

PITTCIDE IS HIGHLY EFFECTIVE FOR—

—Sterilizing equipment and work surfaces.

—Sterilizing utensils and containers.



—Sanitation wherever food is prepared or served.

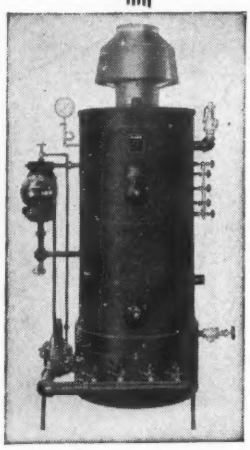
COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
FIFTH at BELLEFIELD · PITTSBURGH 13, PA.

CHICAGO . . . BOSTON . . . ST. LOUIS . . . PITTSBURGH . . . NEW YORK . . . CINCINNATI
CLEVELAND . . . MINNEAPOLIS . . . PHILADELPHIA . . . CHARLOTTE . . . SAN FRANCISCO

Producers of alkalies and related products, including Soda Ash, Caustic Soda, Liquid Chlorine, Sodium Bicarbonate, Calcium Chloride, Caustic Ash, Modified Sodas, Pittchlor

FOR STEAM
AT *CONTROLLED* TEMPERATURES
. . . the *Automatic Gas-fired*
KANE BOILER



The KANE Boiler, in sizes 1 to 30 H.P. built to A.S.M.E. specifications.

Investigate *Engineered Steam.* It's a steam source . . . compact, self-contained, and tailor-made for your job . . . that includes: the study and solution of your problem; the correctly sized and constructed KANE Automatic Gas-Fired Boiler; the necessary controls to maintain proper steam pressure and temperature; the M-K-O Automatic Boiler Feed to provide a constant water level for highest boiler efficiency; and the Engineering and manufacturing Experience (of more than 4 decades) to assure you of an efficient, economical installation.

MEARS-KANE-OFELDT INC.
1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.
FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE.

IT ALL ADDS UP TO
SPICEOLATES
THE BETTER SPICE FLAVORS

Spiceolates have many advantages — and can be used not only to extend your supplies of natural spice oils, but also as complete replacements for them. Spiceolates are very soluble in water and remain in good condition indefinitely under most any circumstances. Write us today for your copy of our New Spiceolate Folder.

D.O DODGE & OLCOTT, Inc.
180 VARICK STREET, NEW YORK 14, N. Y. • BRANCHES: BOSTON • PHILADELPHIA
CHICAGO • ST. LOUIS • LOS ANGELES • PLANT AND LABORATORIES, BAYONNE, N. J.

criteria could be employed to measure the effect of eliminating split stops—stores served by two or more dealers—and the use of helpers on store routes.

The basis of this article has been the belief that the methods which have brought such spectacular results in factory operations should be applied to milk distribution. While it is realized that it is more difficult to utilize these methods in the field of distribution, it cannot be disputed that greater effort should be made in that direction. The technique of time study is suggested in this article and consideration given to the way in which it might be used in milk distribution. These applications are rudimentary but if they begin to be used, milk distribution will enjoy the same remarkable growth in efficiency experienced by the other phases of the milk business in the last 25 years.

—End—

Label Approval

(*Continued from page* 109)

only to carcasses of newcrop lambs slaughtered approximately from March to September inclusive.

In addition to prohibiting misleading names and pictures, the regulations also provide that coverings must not be "deceptive with respect to color, quantity, or kind of product to which they are applied." For example, transparent wrapping material for sliced bacon must not bear red bands, running parallel to the lean meat, that would make the bacon appear leaner.

Labeling regulations prescribe also the minimum percentages of meat or meat by-products that must be used in certain articles. For instance, chili con carne must contain at least 40 percent meat, hash at least 35 percent cooked meat, and meat stews and tamales at least 25 percent meat. The method of calculating the portion or meat or meat by-product is specified. Among other requirements, hamburgers must be made of fresh beef and must not contain more than 30 percent of fat.

Other Labeling Requirements

Another requirement provides for informative statements on labels of meat food products if artificial coloring or flavoring is used. The same requirement applies to preservatives. All these materials, of course, must be of a kind that is legally permitted.

NOW AVAILABLE FROM WAREHOUSE STOCKS . . . *in the forms and sizes you need*

"MONEL"

SHEET • TUBING • STRIP • BAR • ROD
PLATE • WIRE AND WIRE CLOTH

For durable, corrosion-resistant equipment, insist upon Monel

Today, you can enjoy all the advantages of Monel* . . . in all kinds of plant equipment. For Monel is available *in quantity* . . . in the forms you need.

You can get sheet Monel for tables and work surfaces . . . for tanks, trays, hoppers and chutes. Or seamless Monel tubing for heating coils . . . Monel rod, bar, strip, wire and wire cloth for a variety of other uses.

You probably know Monel's resistance to corrosion. You may also know how this strong, solid metal withstands hard knocks and constant use.

Health officials, too, give Monel their okay. This rustproof Nickel Alloy doesn't affect the purity, color or flavor of food products. Its smooth, lustrous surfaces are clean and sanitary.

When you need new plant equipment or utensils, it is sound economy to have them made of Monel. And remember, when you need to make repairs, Monel is easy to work with. And we've a lot of helpful information available that tells you how. The bulletin mentioned below, for example. It's free. Why not let us send you a copy now?

Just mail the coupon.

PROMPT DELIVERY ASSURED
There's an INCO Distributor near you!

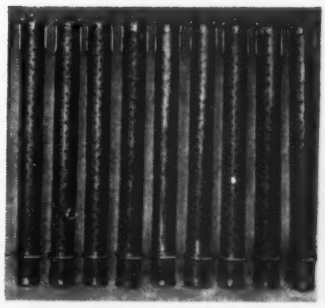
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

NICKEL (INCO TRADE MARK) ALLOYS

MONEL* • "K"* MONEL • "S"* MONEL • "R"* MONEL • "KR"* MONEL • INCONEL* NICKEL • "Z"* NICKEL • "L"* NICKEL

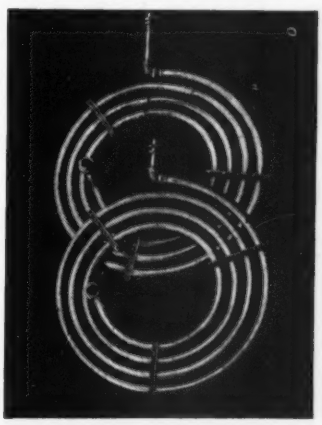
*Reg. U. S. Pat. Off.

SELF-SUPPORTING BLANCHING TANK. This simple and efficient all-Monel unit was fabricated by the user, a well-known West Coast canning plant.



OIL FILTER PRESS. Screens are made of Monel wire cloth. They are rustproof and corrosion resistant. Stand up under high pressure and hard use.

STRAINERS FOR TOMATO SCALDING TANKS. These are made from perforated Monel sheet, and fitted with Monel handles and flanges. They're strong, tough and trouble-free.



MONEL HEATING AND COOLING COILS prevent harmful metallic contamination and discoloration. Monel is readily fabricated by ordinary methods.

SEND FOR FREE BULLETIN!

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

Repairing our own corrosion-resistant equipment sounds like a good idea. Please rush my copy of your free bulletin T-2, "WELDING, BRAZING AND SOFT-SOLDERING OF MONEL."

Name.....

Company.....*Title*.....

Address.....

City.....*Zone*.....*State*.....

F.I.6-47

CONVEYCO PACKER COUNTER

COUNTS PRODUCTION *Automatically*

AN UP-TO-THE-MINUTE TALLY of production in your plant is always visible with the accurate Conveyco Packer Counter. Each employee's total shows on individual recorders and the total production of the entire plant is recorded on a totalizator.

TESTED IN VEGETABLE PACKING PLANTS and Food Processing Plants . . . the Conveyco Packer Counter has reduced overhead, eliminated errors in counting, and minimized personnel problems regarding piece-work pay.

JUST A TOUCH OF A BUTTON located at each work station counts completed units of work in plants using assembly line methods or where employees are paid on a piece-work basis.

TOTAL TALLY IS DOUBLE CHECKED by an automatic counting trigger which counts items as they leave processing or packing room.

LOW OPERATING COST . . . . Uses less electricity than a 60 Watt light bulb.

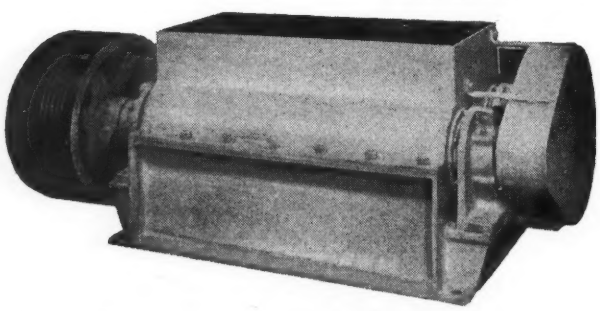
EASY TO INSTALL in any size plant with any number of employees.

Write for catalog sheet. Ask for names of plants where packer counters are in operation.

THE CONVEYOR CO.
ENGINEERS • MANUFACTURERS
3260 EAST SLAUSON AVENUE LOS ANGELES 11, CALIFORNIA
CONVEYCO

ROBINSON
PROCESSING UNIQUE EQUIPMENT

SAW TOOTH *Crushers*



Improved Type!

Rugged construction. Crushes material to finished size. Blades spaced to your specifications. Capacity from 3 to 15 tons. Roller bearing mounted shaft. Robinson Processing Equipment designed by engineers whose reputation is founded upon doing things right. Literature available. Inquiries invited.

ROBINSON MANUFACTURING CO.
Plant: Muncy, Pa.
SALES REPRESENTATIVE
MERCER-ROBINSON COMPANY, INC.
30 CHURCH ST., NEW YORK 7, N. Y.

Several other safeguards, largely of general nature, apply to the use of labels. One is the obliteration of all stencil marks or labels on previously used containers, unless such markings correctly indicate the article and the containers are refilled under official supervision. Another safeguard provides for the relabeling of containers when the original label has been mutilated or otherwise damaged. Still another deals with the rescindment of approval of labels that have become obsolete.

Developed over a period of years, the regulations of the meat inspection service now cover practically every contingency likely to arise. Plant managers can usually settle special problems, involving any of the regulations, by discussing them directly with the inspector-in-charge. If the manager or other officer of the plant prefers he may take up any problem with the Chief of the Meat Inspection Division in Washington. This may be done by correspondence, telephone, telegraph or personal call. For the guidance of correspondents, A. R. Miller is chief of the Division.

Further information regarding the scope and purpose of Federal meat inspection, including copies of the complete regulations, are available to interested persons. Request may be made to local employees or to the Chief of the Meat Inspection Division, Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.

—End—

Froth Flotation

(*Continued from page* 88)

the surface tension-percent air relationship. It has been observed that when pumps operate at a level of about 12 percent air, the surface tension is much lower for efficient separation than when operating at higher air levels.

Reagents

Oils found to be most satisfactory for use in preparing emulsions had an initial boiling point (ASTM) of about 400 deg. F. and a final boiling point of 500 deg. F., and a Saybold viscosity at 100 deg. F. of 30 to 35. The oil should be as free as possible from odor, aromatic hydrocarbons, and unsaturated compounds. It has not been possible to make a detailed study of the numerous synthetic detergents now available. From a study of several commercial alkyl sodium sulphate

Food and Business Sprout Fast in

SAN ANTONIO'S GREAT AGRICULTURAL EMPIRE

Only a few years ago, San Antonio was the chief city in a country devoted almost entirely to the raising of cotton and cattle. Cattle were shipped from here to be fattened elswhere. Today, they are fed hybrid corn grown in Texas . . . and more and more of them are being slaughtered in San Antonio. Today, San Antonio has a produce market that ranks first in the nation in dollar volume.

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San Antonio

SETS THE STAGE FOR INDUSTRY

San Antonio's Package for the Packer

MARKETS San Antonio is in the midst of a swiftly developing territory whose population has been increasing for several decades at a faster pace than the national average. National and international markets are easily reached from San Antonio—over 50% of Mexican exports clear through the San Antonio customs district.

LABOR There is a large pool of skilled, intelligent and cooperative labor. Major labor troubles are unknown.

TAXES AND INDUSTRIAL LAWS Texas has no state sales or state income taxes. Industrial laws and regulations are drawn to encourage the development and expansion of industry.

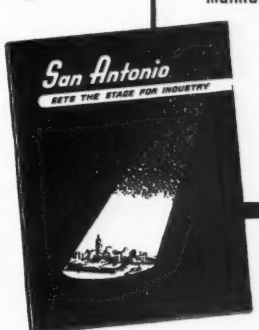
TRANSPORTATION San Antonio is served by major rail, air and truck lines radiating in every direction. Texas has excellent trunk and feeder highways. San Antonio is strategically located, convenient to low cost water transportation.

RAW MATERIALS Almost anything which can be grown in the United States can be profitably grown in Southwest Texas. The Rio Grande Valley, Winter Garden area and many others have a huge production of citrus fruits and vegetables. Hundreds of thousands of acres are being added to this extremely fertile irrigated area. Grain, poultry and livestock production is zooming.

POWER AND FUEL Low cost industrial natural gas is abundant. Electric power is adequate and reasonable.

LIVING CONDITIONS The mild climate permits low living costs. There is plenty of room for good living and industrial homes. Parks, playgrounds, popular amusements, sports and recreations enjoy national recognition. Cultural attractions are superior. From kindergarten through college, public and private schools maintain high standards of education.

BUILDINGS AND SITES Because of the shallow footing required and the mild climate, building construction is economical in San Antonio. Many industries use light structures and do outdoor work the year around. Choice industrial sites are still available.



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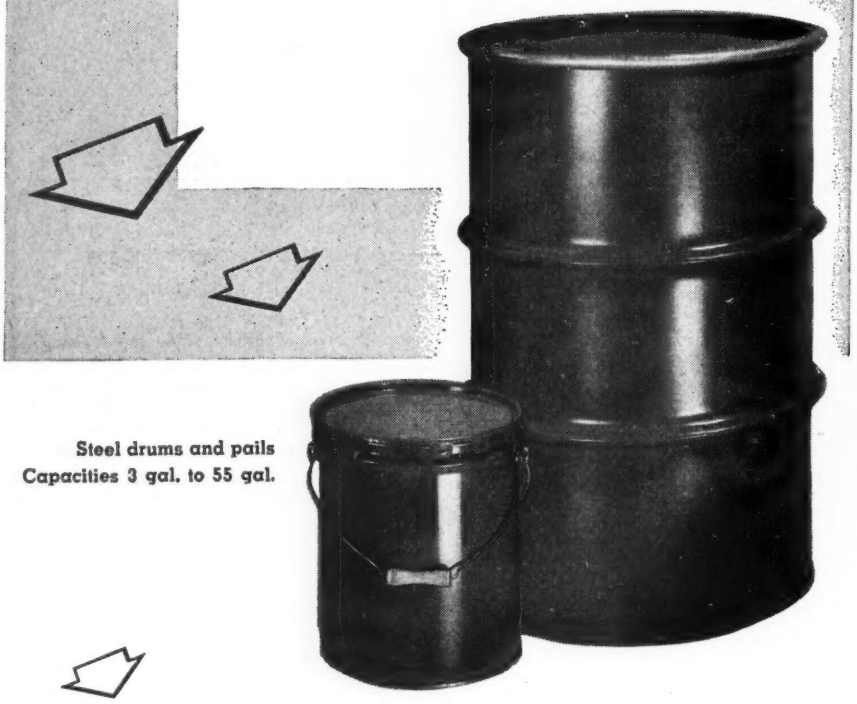
...the cheapest packaging is packaging that is proof against losses



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preparations it appears that alkyl sodium sulphate in which the lauryl group predominates are most satisfactory when used in conjunction with the automatic regulator.

Acknowledgments

Acknowledgment is made to the Oregon-Washington Canners, an organization of pea canners formed to assist in these studies, for their cooperation. Special thanks are due the Rogers Canning Company, Walla Walla Canning Company, and Libby, McNeil and Libby, in whose plants much of the experimental work was conducted.

References

1. M. K. Veldhuis and A. M. Neubert, *Western Canner and Packer*, 36 (6): 18, 47, 1944.
2. A. M. Neubert and M. K. Veldhuis, Food Industries, 17, 494-497, 608-616, 1945.

—End—

Conversion Process

(*Continued from page* 84)

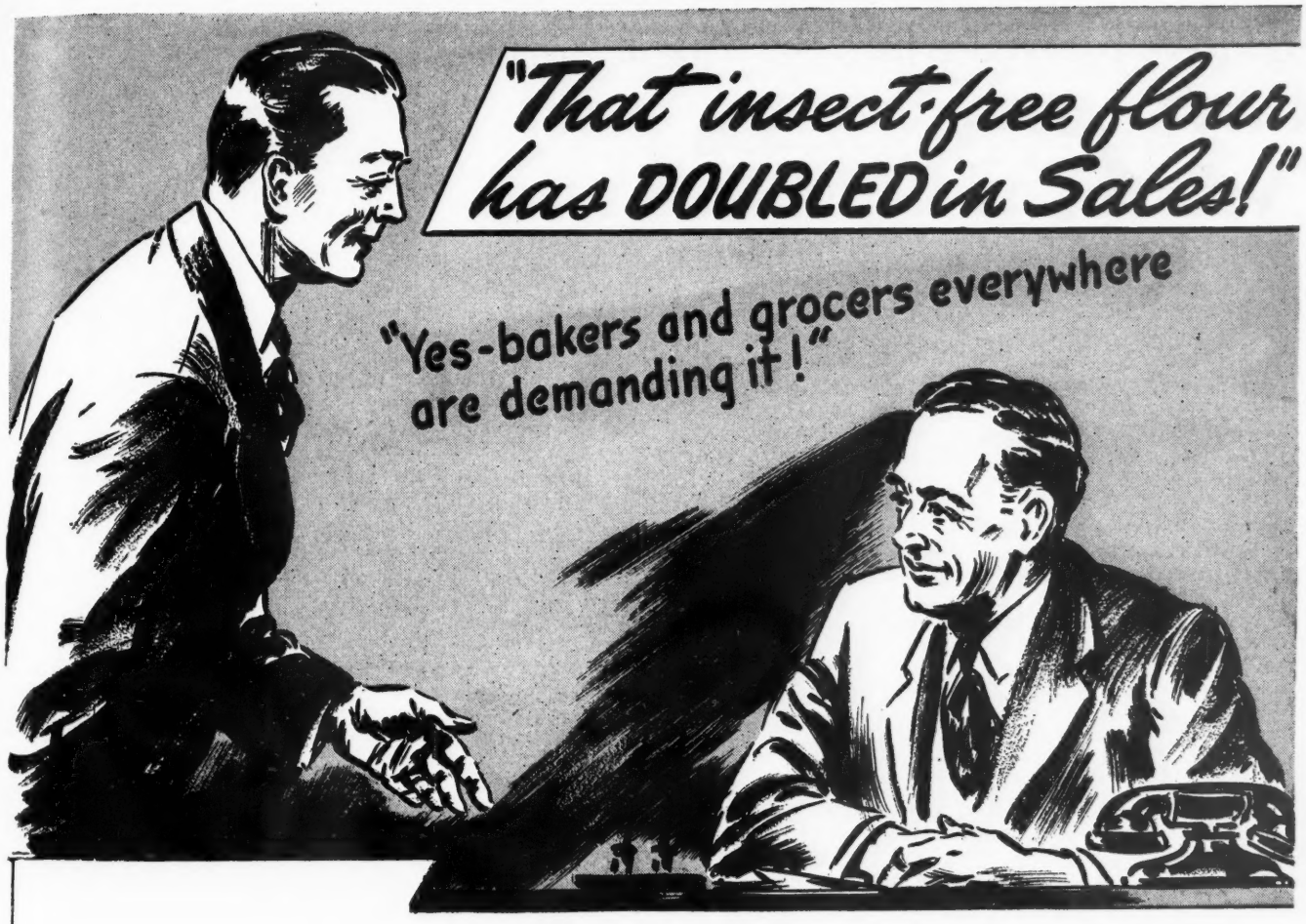
shine cannot be controlled by man. Soil conditions to a certain extent can be handled by proper agronomic technics. Considering such factors, it is not surprising that farm crops such as cereals are significantly influenced in regard to their physical and chemical makeup. A very pronounced difference in physical and chemical properties have been shown by numerous workers to be due to varieties.

Sampling Rough Rice

Rough rice coming into the Converted Rice plants is sampled by mechanical samplers to insure a representative sample. The sample is sent to the laboratory for physical and chemical tests. Physical inspection includes shelling of the rice on specially designed shelling boards and actual hand grading by rice graders for foreign material, brokens, shelled grains, damage, diseased grains, maturity and general physical appearance. From this inspection a report is filed and the sample is given a grade.

Pilot Plant Tests

The inspected sample is then passed on for pilot plant tests. The pilot plant provides a miniature duplication of the actual main plant operations. Here the sample is cleaned and processed, only a few pounds of the sample being required. From the pilot plant run, actual process instructions such as processing times and temperatures, are obtained. These instructions are written up and forwarded to the plant manager to be used for a spe-



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BUG-LIFE doesn't have a chance to spoil food products when "ENTOLETER" Continuous Insect Control is installed in the processing plant. With this tested and proved protection, you benefit 3-ways:

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Operating records show that "ENTOLETER" Control destroys insect life in all its forms, in flour, meal, mixes, cereals, powdered soups and similar free-flowing dry materials. In addition to its primary function of insect control, the "ENTOLETER" system is an excellent means of blending flours, mixing compounds and improving vitamin distribution. It is wholly mechanical; uses no heat, gas or chemicals, and does not change moisture content of "ENTOLETER" products. The system is easy to install; simple to operate and maintain. Send coupon now for full information on "ENTOLETER" Control. We shall be glad to show how it can be applied to your products.

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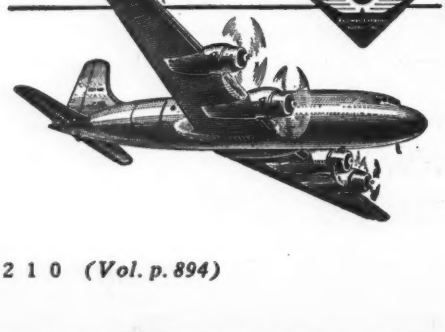

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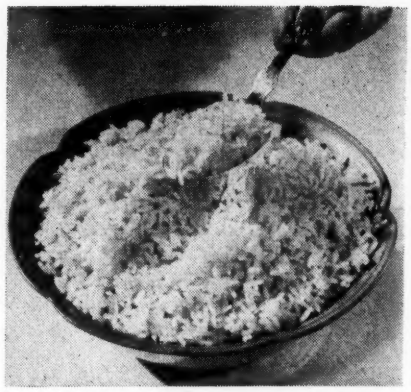

As a result of the special process, Converted Rice, when ready to serve, is plump and fluffy, with the kernels all separate.

cific lot of rice.

The processed rice from the pilot plant, immediately after vacuum drying, is placed in a conditioning cabinet for a moisture equalization period, and then it is milled on a laboratory mill. From the milling results a yield is set for so many pounds of head rice, brokens, bran and hulls. The head rice is inspected by rice graders and a quality grade is given. The milling data are recorded and forwarded to the commercial manager, who compiles such information and also uses it as a check against buyer's predicted yields. The laboratory data also serves as an indicator of plant efficiency in processing a given lot of rice.

Sampling Head Rice

The Converted head rice is sampled by mechanical samplers as it goes to the sacking scales. These representative samples are brought to the laboratory for both physical and chemical tests. Each lot is graded for the amount of brokens, moisture percentage, color, degree of milling, conversion and vitamin assays.

Laboratory Determinations

Thiamine is determined by the standard thiochrome method. Riboflavin, likewise, is determined chemically. The methods involve the use of a fluorophotometer. Niacin is determined by the cyanogen bromide method and the color developed is measured in a spectrophotometer.

Quality control standards have been established by the laboratory. From the pilot plant runs, using varying times and temperatures and with varying degrees of milling, standards were arrived at taking into consideration color, degree of milling and conversion. Spe-

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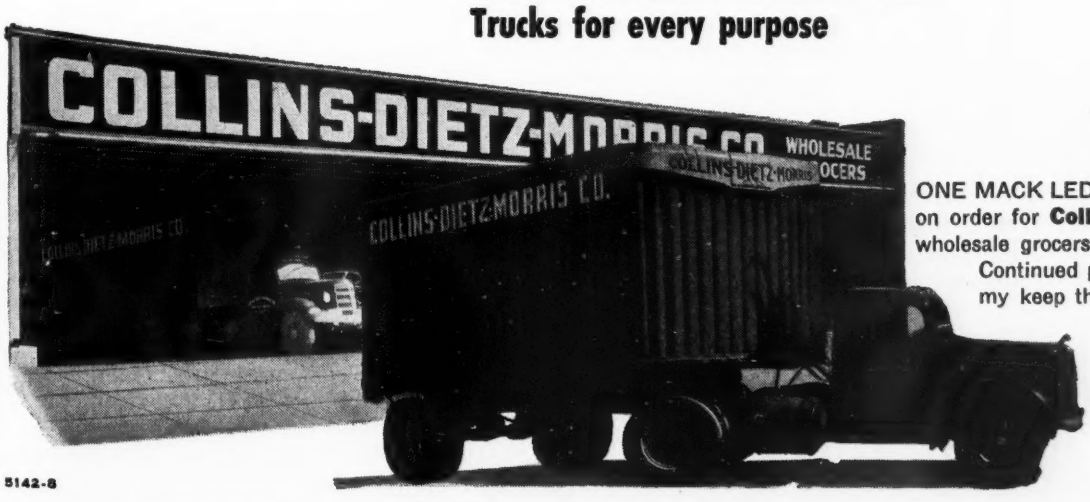

ONE MACK LED TO SIX...and more are on order for **Collins-Dietz-Morris Co.,** wholesale grocers of **Tulsa, Oklahoma.** Continued performance and economy keep this firm sold on Macks.

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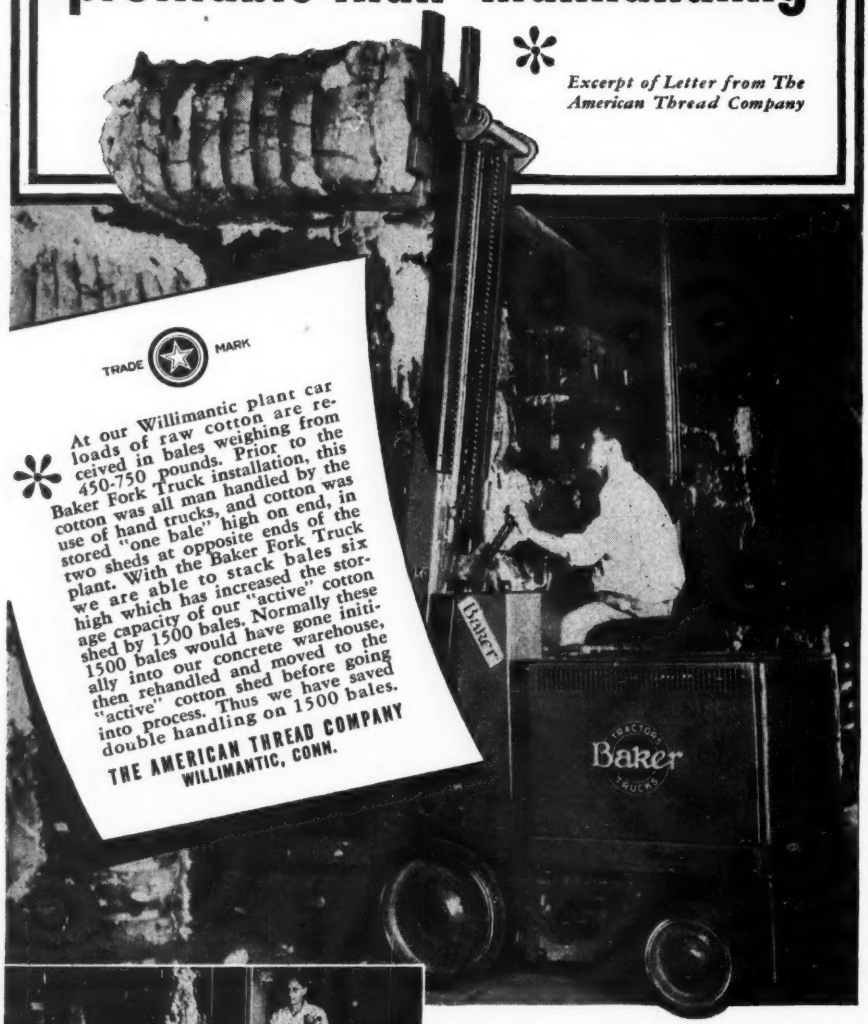
Handling Bales with BAKER TRUCK proves more profitable than "manhandling"

Excerpt of Letter from The American Thread Company


TRADE MARK
At our Willimantic plant car loads of raw cotton are received in bales weighing from 450-750 pounds. Prior to the Baker Fork Truck installation, this cotton was all man handled by the use of hand trucks, and cotton was stored "one bale" high on end, in two sheds at opposite ends of the plant. With the Baker Fork Truck we are able to stack bales six high which has increased the storage capacity of our "active" cotton shed by 1500 bales. Normally these 1500 bales would have gone initially into our concrete warehouse, then rehandled and moved to the "active" cotton shed before going into process. Thus we have saved double handling on 1500 bales.
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No matter what type of material you handle in your plant, you can cut intraplant transportation, storage or carloading costs with Baker Trucks. Call your nearest Baker representative or write us direct.

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Baker INDUSTRIAL TRUCKS

cialized technics, using the principle of colorimetry, were developed in the laboratory for determining degree of color.

Research

The research laboratory is investigating a wide variety of problems relating to rice and its processing. For example, an infra-red drier has been designed and built for studying this type of drying in comparison with the drying methods now being used in the plant. High frequency, or dielectric drying, is also being considered.

Research is done also on rice by-products, seeking methods for commercial separation of materials of industrial value and new product development from the by-products of the rice.

Experimental Canning

An experimental canning program has been set up to determine optimum process conditions for canning Converted Rice. This work is revolutionary, since Converted Rice can be canned to give a uniform quality pack, whereas white milled rice cannot. Sample packs are prepared with rice alone and as a component in other dishes, such as chicken and vegetables, Spanish rice, chile and rice.

—End—

Quality of Kraut

(*Continued from page* 96)

Kraut in cans is an extremely poor conductor of heat. Thus, long heating in cans has always been essential for sterilization. These facts have not been utilized until lately in canning kraut.

It therefore follows that heating before filling into cans is more efficient than sterilizing the cans. A positive temperature of 165 deg. F. should be sufficient for heating kraut before filling into cans, because most microorganisms are killed at 145 deg. F.

No food product is stable. Despite the destruction of bacteria, inactivation of enzymes and removal of air, chemical changes may go on. These changes are proportional to temperature. This is of particular importance in canned or bottled juice. Juices stored at 34 deg. F. will remain in good condition for months. If, on the other hand, they are stored at room temperature, they will darken, form a precipitate, and take on a poor flavor within a month.